FIG. 1

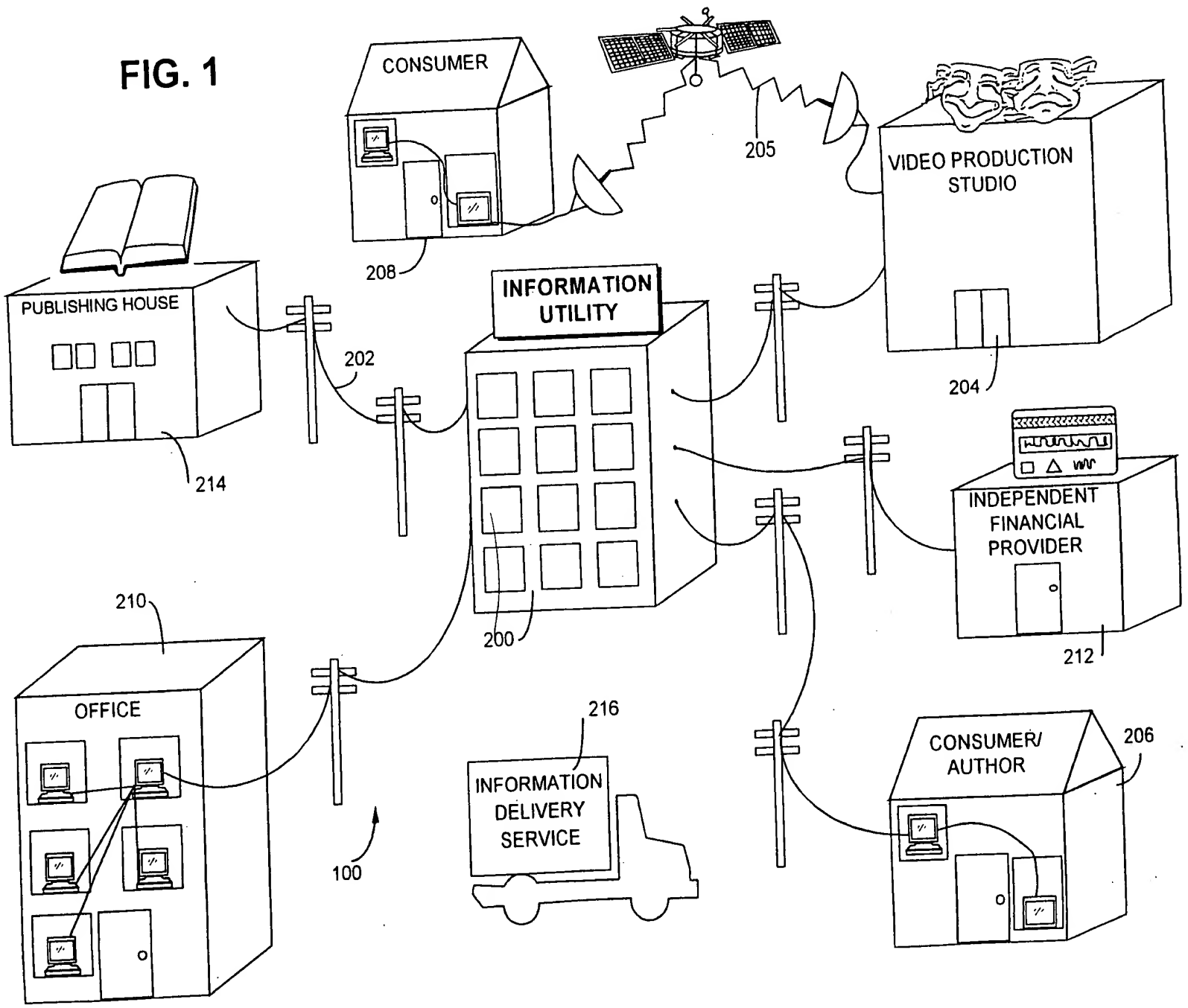

CONSUMER
205
VIDEO PRODUCTION STUDIO
208
INFORMATION UTILITY
PUBLISHING HOUSE
202
204
214
INDEPENDENT FINANCIAL PROVIDER
210
200
212
OFFICE
216
INFORMATION DELIVERY SERVICE
CONSUMER/ AUTHOR
206
100

FIG. 1A

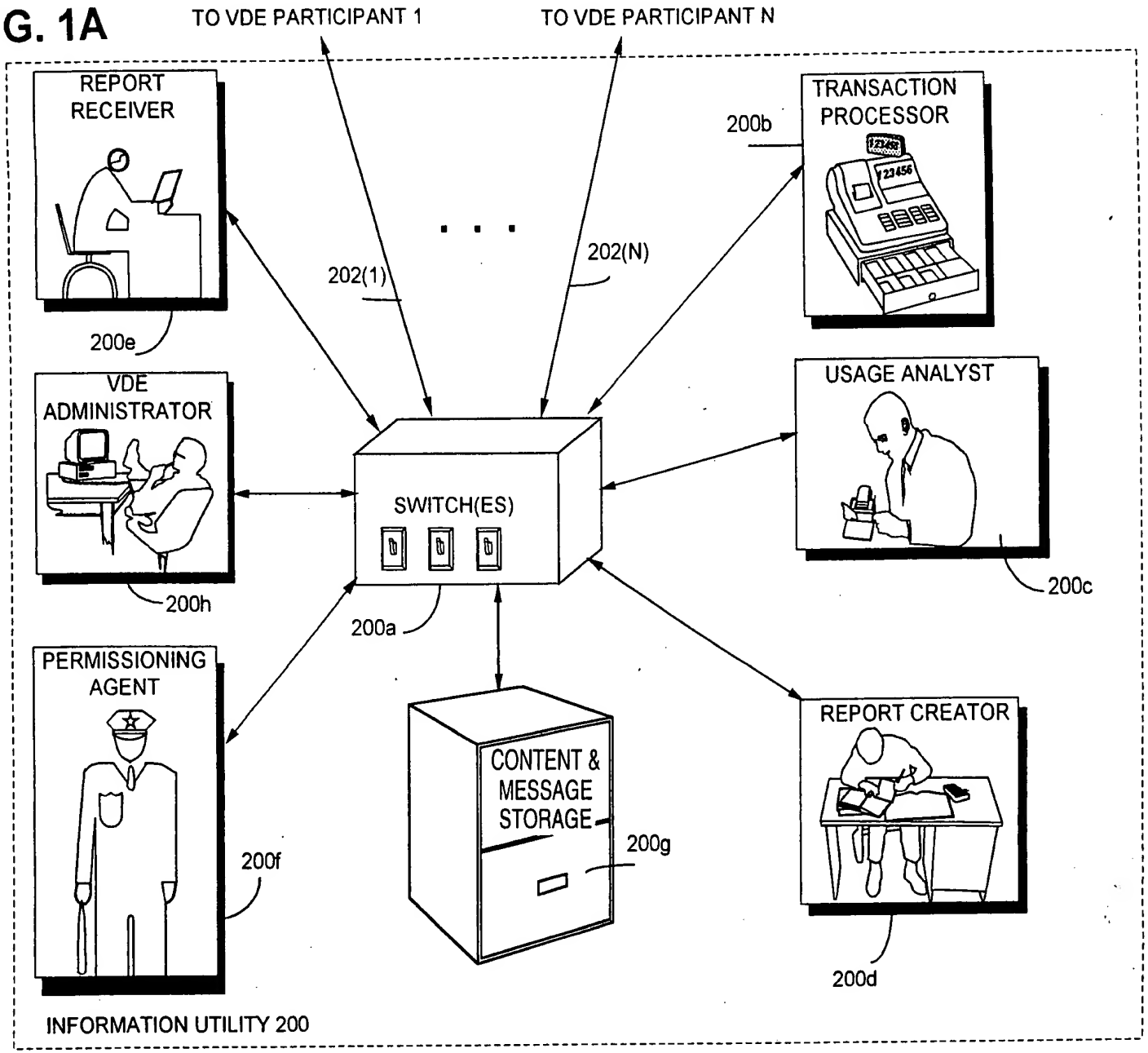

TO VDE PARTICIPANT 1
TO VDE PARTICIPANT N
REPORT RECEIVER
200e
TRANSACTION PROCESSOR
200b
202(1)
202(N)
VDE ADMINISTRATOR
200h
SWITCH(ES)
200a
USAGE ANALYST
200c
PERMISSIONING AGENT
200f
CONTENT & MESSAGE STORAGE
200g
REPORT CREATOR
200d
INFORMATION UTILITY 200

FIG. 2

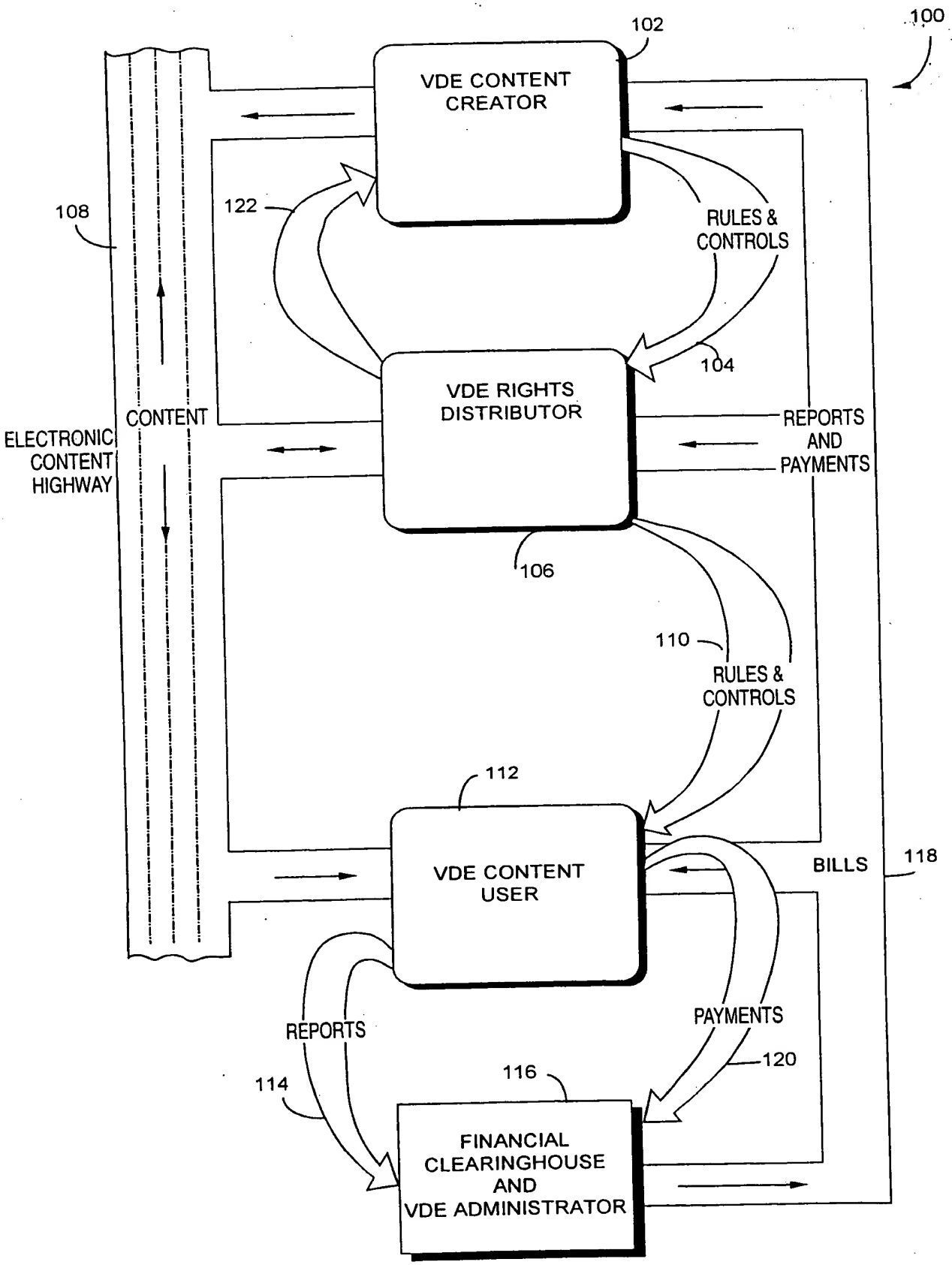

100
102
VDE CONTENT CREATOR
108
122
RULES & CONTROLS
104
VDE RIGHTS DISTRIBUTOR
CONTENT
ELECTRONIC CONTENT HIGHWAY
REPORTS AND PAYMENTS
106
110
RULES & CONTROLS
112
VDE CONTENT USER
BILLS
118
REPORTS
PAYMENTS
120
114
116
FINANCIAL CLEARINGHOUSE AND VDE ADMINISTRATOR

FIG. 2A

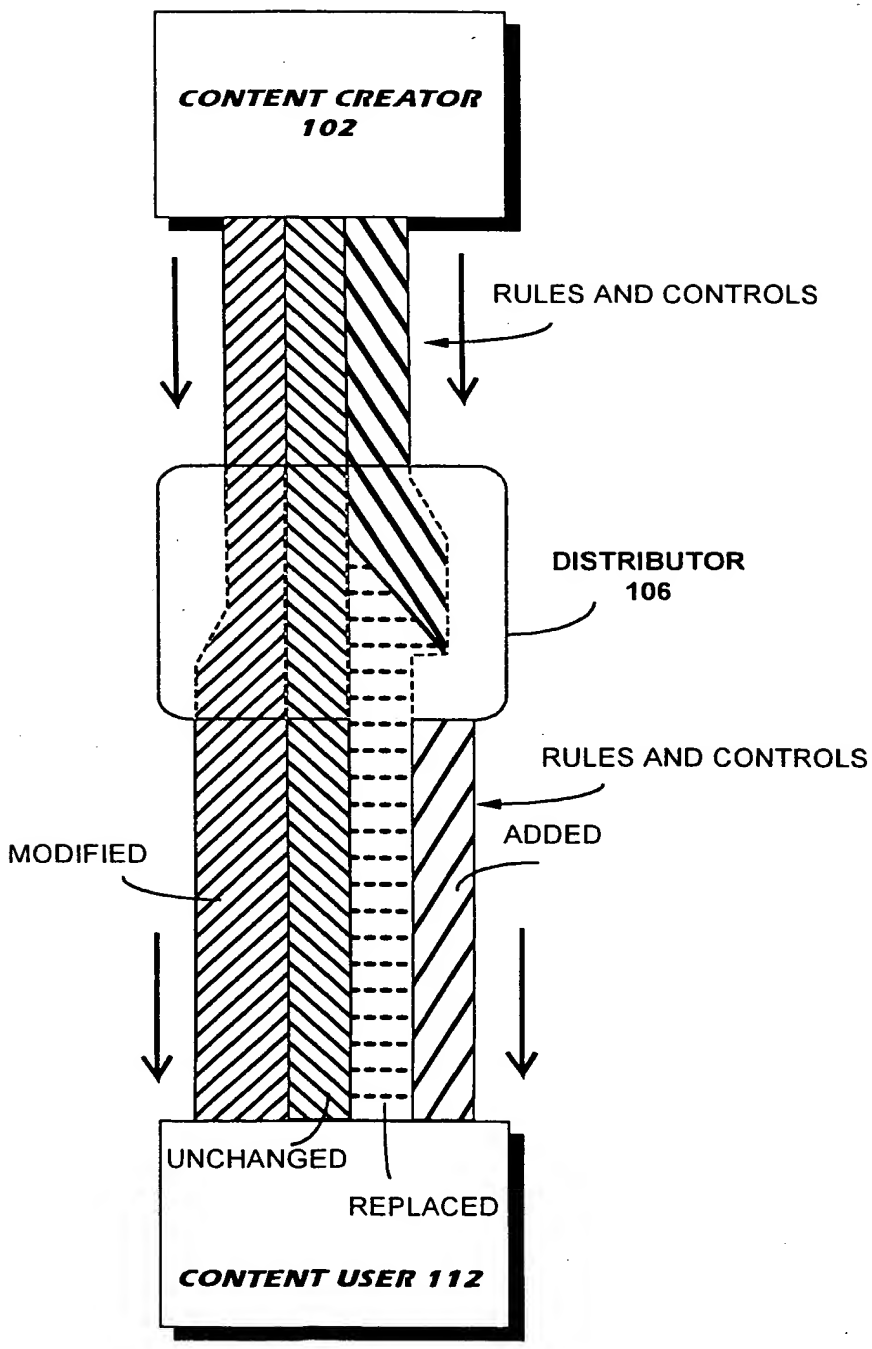
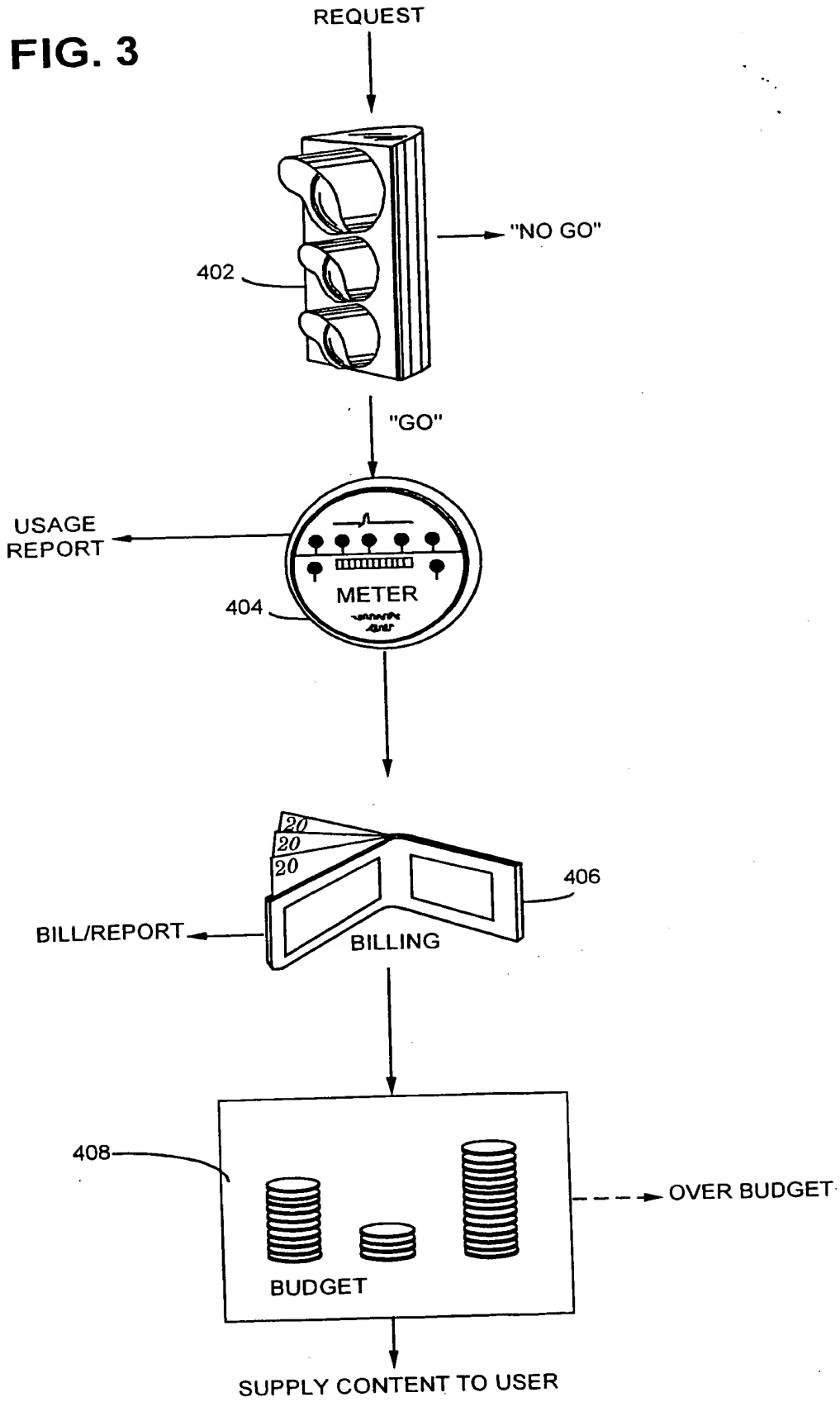

CONTENT CREATOR
102
RULES AND CONTROLS
DISTRIBUTOR
106
RULES AND CONTROLS
ADDED
MODIFIED
UNCHANGED
REPLACED
CONTENT USER 112

FIG. 3


REQUEST
"NO GO"
402
"GO"
USAGE REPORT
METER
404
20
20
20
406
BILL/REPORT
BILLING
408
OVER BUDGET
BUDGET
SUPPLY CONTENT TO USER

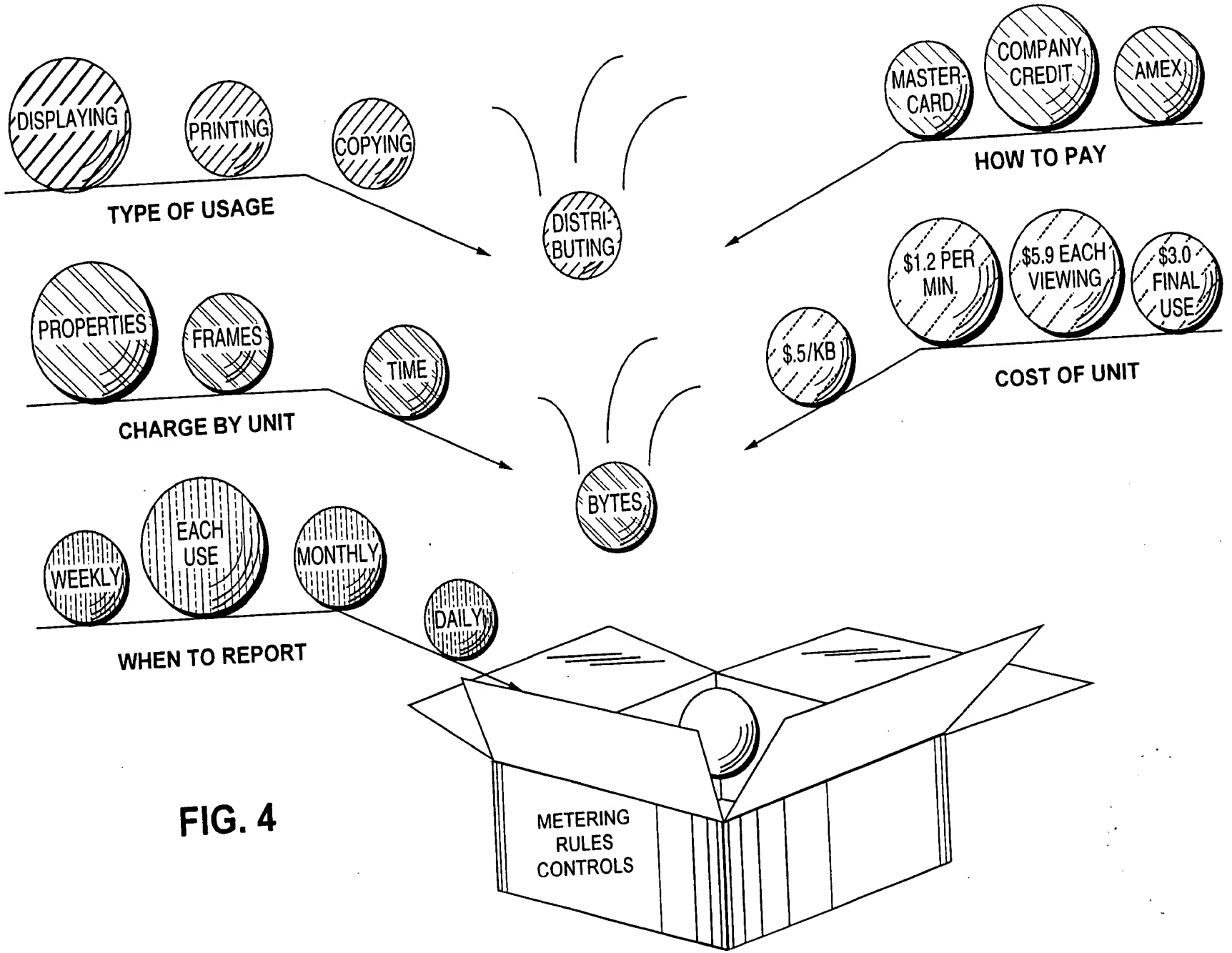

DISPLAYING
PRINTING
COPYING
TYPE OF USAGE
MASTER-CARD
COMPANY CREDIT
AMEX
HOW TO PAY
DISTRI-BUTING
PROPERTIES
FRAMES
TIME
CHARGE BY UNIT
$.5/KB
$1.2 PER MIN.
$5.9 EACH VIEWING
$3.0 FINAL USE
COST OF UNIT
BYTES
WEEKLY
EACH USE
MONTHLY
DAILY
WHEN TO REPORT
METERING RULES CONTROLS

FIG. 4

FIG. 5A

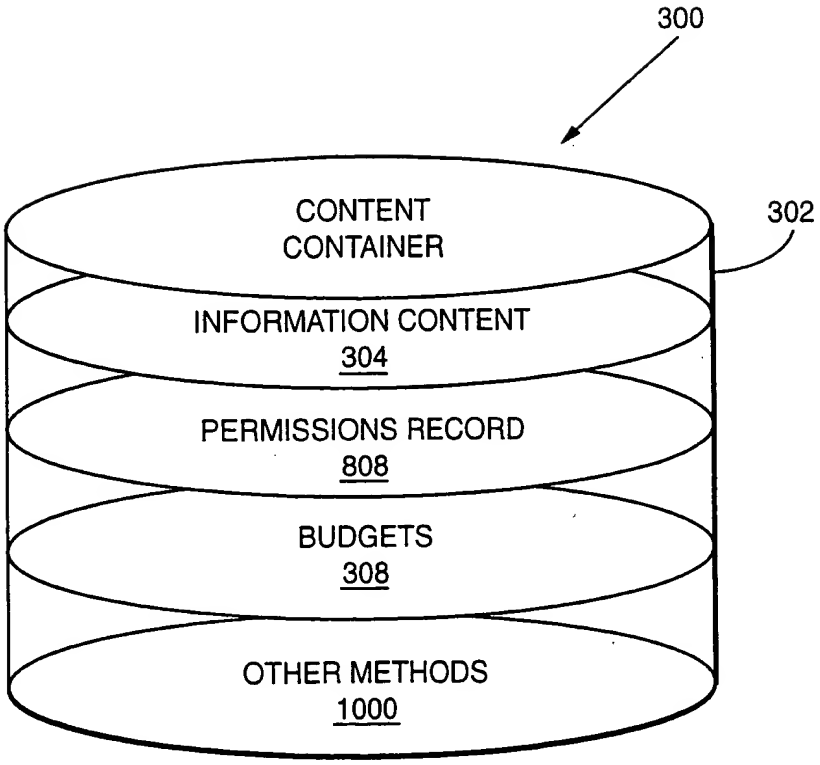
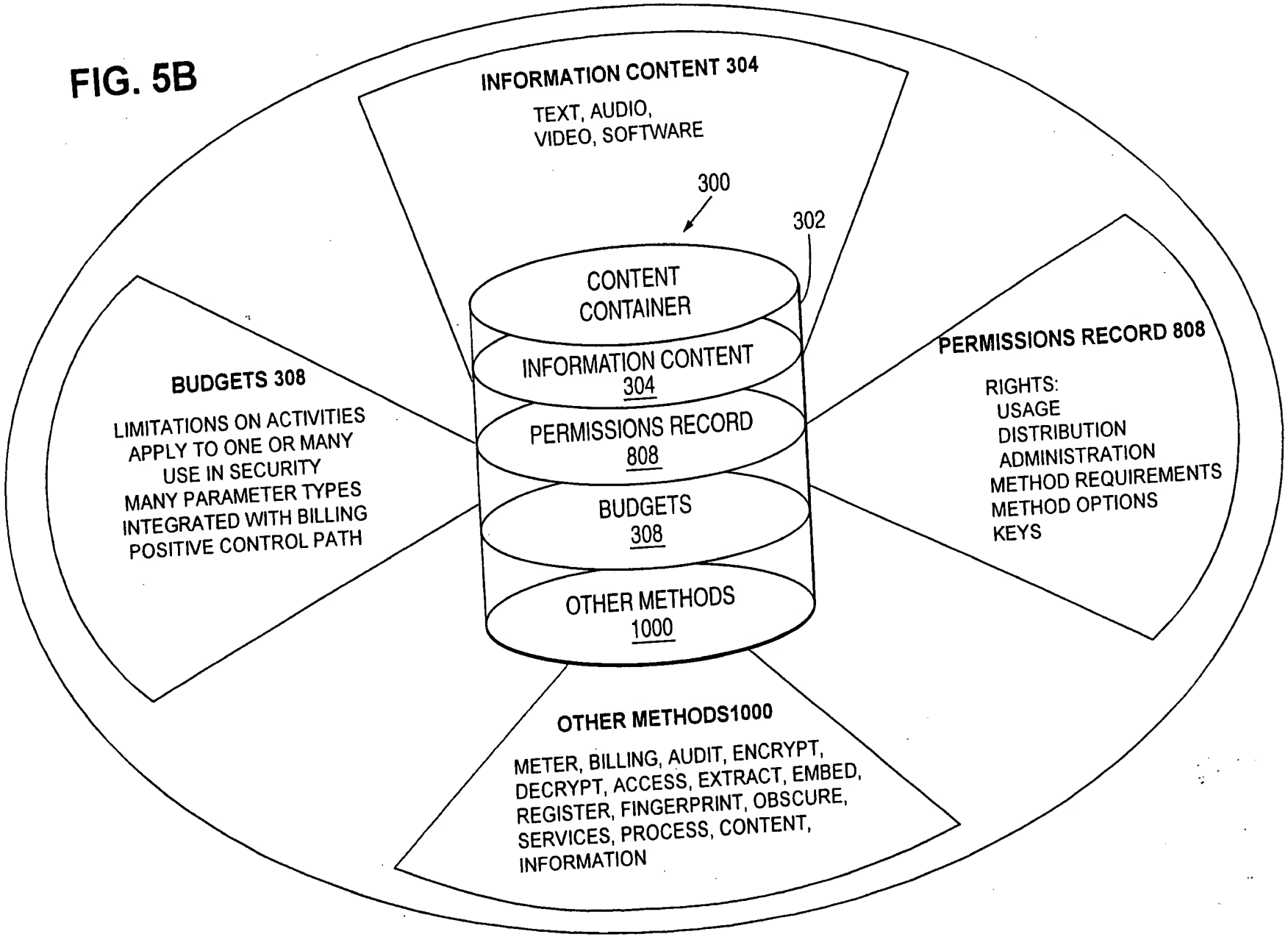

300
CONTENT
CONTAINER
302
INFORMATION CONTENT
304
PERMISSIONS RECORD
808
BUDGETS
308
OTHER METHODS
1000

FIG. 5B


INFORMATION CONTENT 304
TEXT, AUDIO,
VIDEO, SOFTWARE
300
302
CONTENT
CONTAINER
INFORMATION CONTENT
304
PERMISSIONS RECORD
808
BUDGETS
308
OTHER METHODS
1000
BUDGETS 308
LIMITATIONS ON ACTIVITIES
APPLY TO ONE OR MANY
USE IN SECURITY
MANY PARAMETER TYPES
INTEGRATED WITH BILLING
POSITIVE CONTROL PATH
PERMISSIONS RECORD 808
RIGHTS:
USAGE
DISTRIBUTION
ADMINISTRATION
METHOD REQUIREMENTS
METHOD OPTIONS
KEYS
OTHER METHODS1000
METER, BILLING, AUDIT, ENCRYPT,
DECRYPT, ACCESS, EXTRACT, EMBED,
REGISTER, FINGERPRINT, OBSCURE,
SERVICES, PROCESS, CONTENT,
INFORMATION

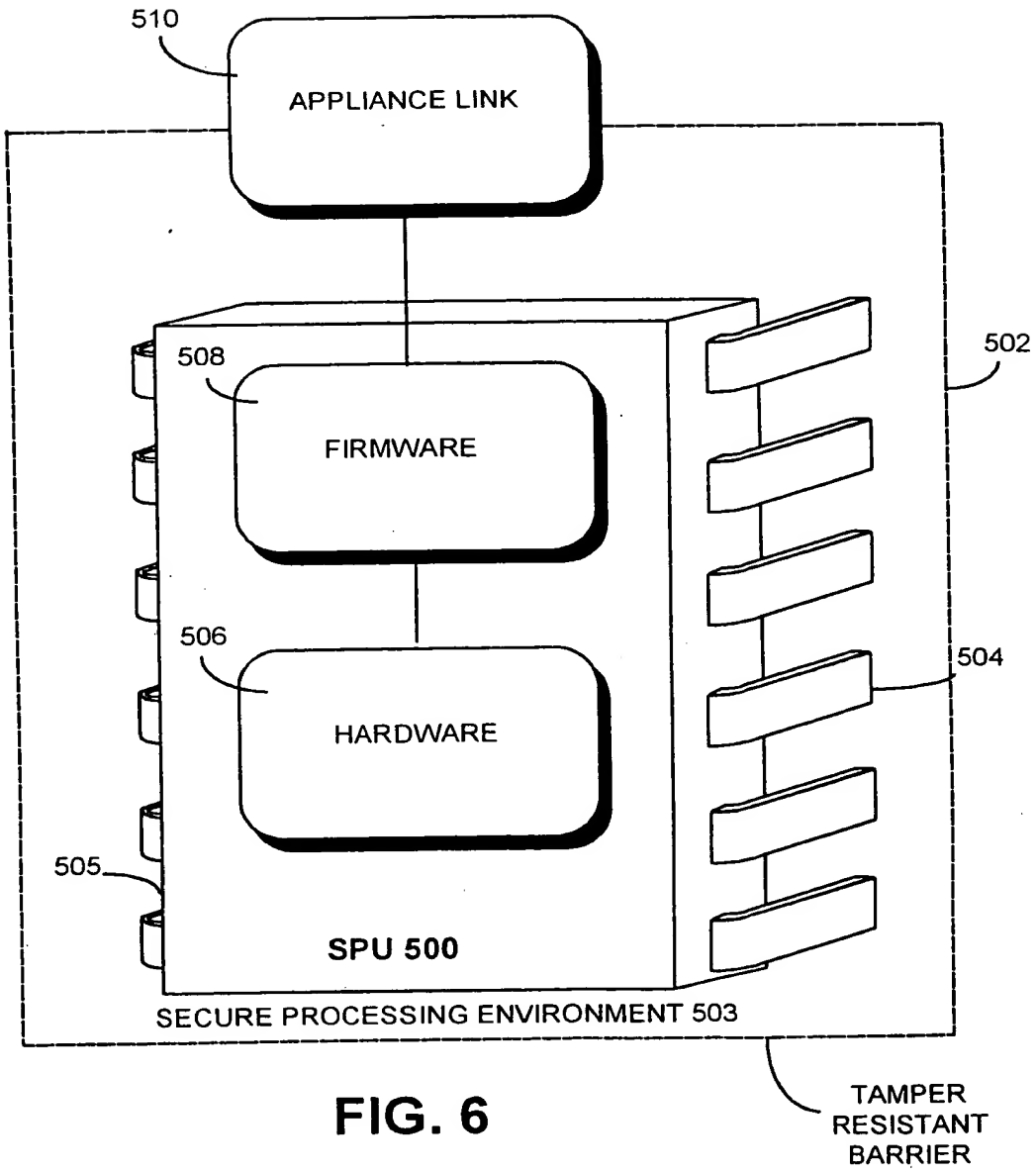

510
APPLIANCE LINK
502
508
FIRMWARE
506
HARDWARE
504
505
SPU 500
SECURE PROCESSING ENVIRONMENT 503
TAMPER
RESISTANT
BARRIER

FIG. 6

FIG. 7

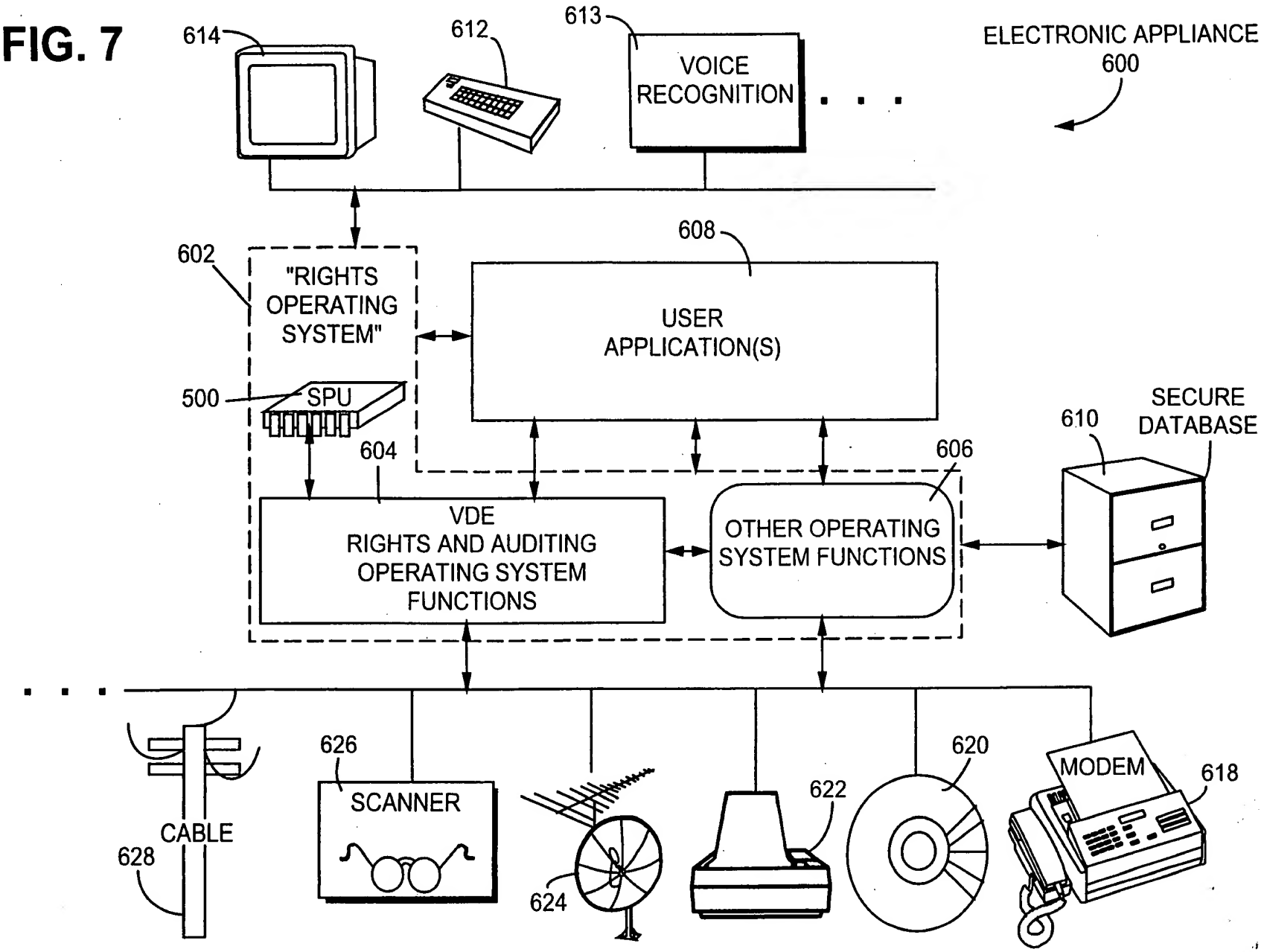
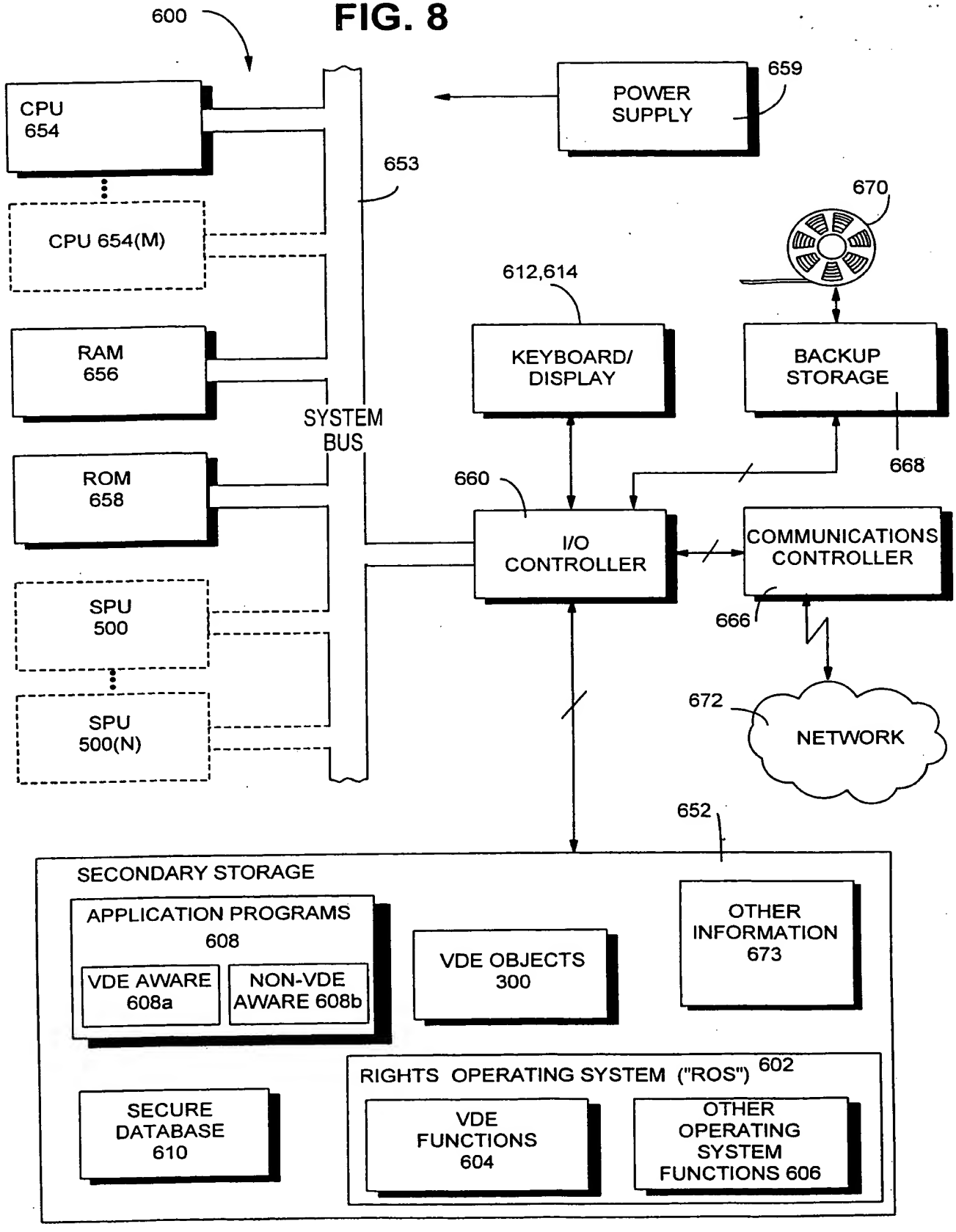

614
612
613
VOICE RECOGNITION
ELECTRONIC APPLIANCE
600
602
"RIGHTS OPERATING SYSTEM"
608
USER APPLICATION(S)
500
SPU
604
606
610
SECURE DATABASE
VDE RIGHTS AND AUDITING OPERATING SYSTEM FUNCTIONS
OTHER OPERATING SYSTEM FUNCTIONS
626
SCANNER
620
MODEM
618
622
CABLE
628
624

FIG. 8


600
CPU 654
CPU 654(M)
RAM 656
ROM 658
SPU 500
SPU 500(N)
SYSTEM BUS
653
POWER SUPPLY
659
670
612,614
KEYBOARD/ DISPLAY
BACKUP STORAGE
668
660
I/O CONTROLLER
COMMUNICATIONS CONTROLLER
666
672
NETWORK
652
SECONDARY STORAGE
APPLICATION PROGRAMS 608
VDE AWARE 608a
NON-VDE AWARE 608b
VDE OBJECTS 300
OTHER INFORMATION 673
RIGHTS OPERATING SYSTEM ("ROS") 602
SECURE DATABASE 610
VDE FUNCTIONS 604
OTHER OPERATING SYSTEM FUNCTIONS 606

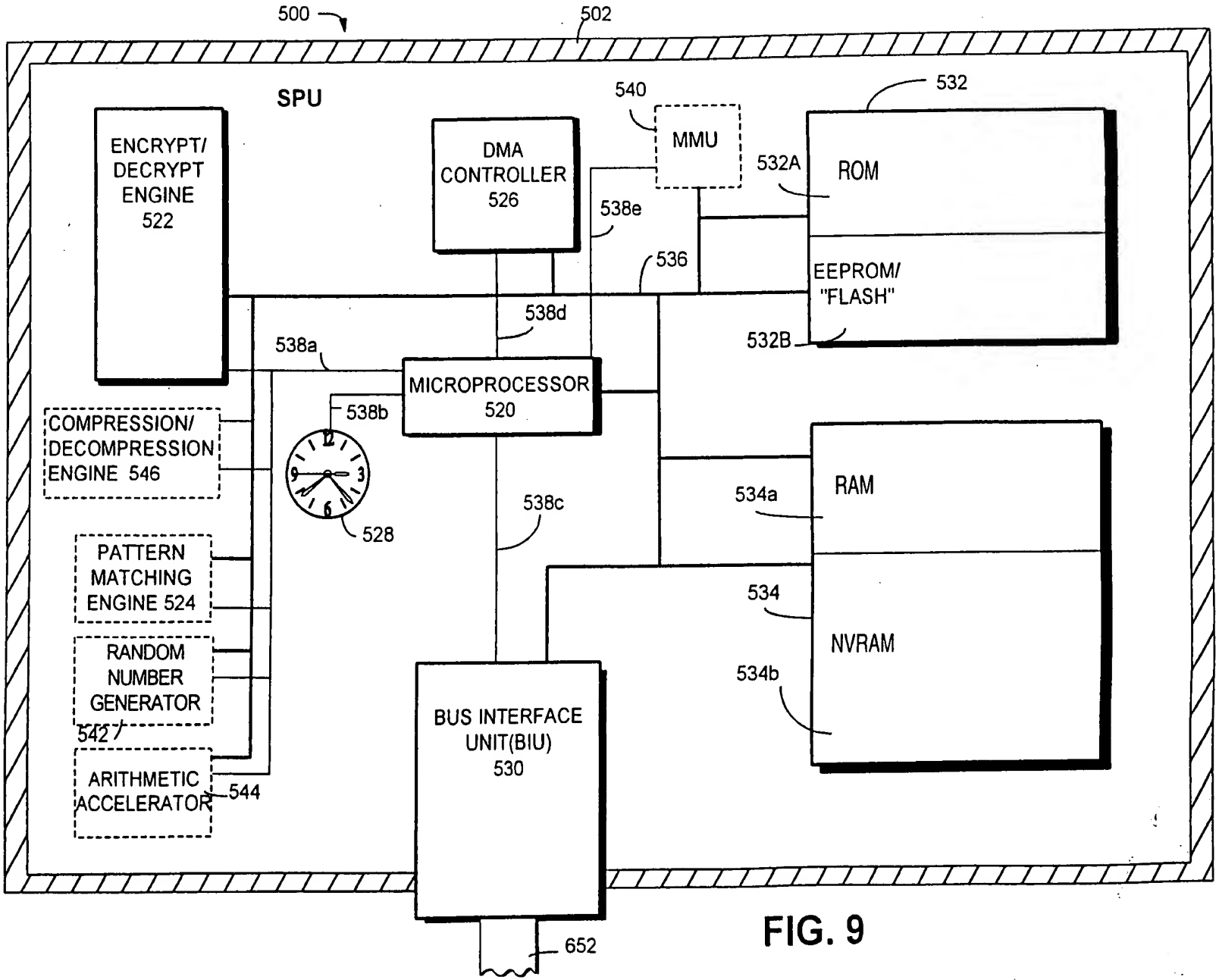

500
502
SPU
ENCRYPT/
DECRYPT
ENGINE
522
DMA
CONTROLLER
526
540
MMU
532
532A
ROM
538e
536
EEPROM/
"FLASH"
532B
538d
538a
MICROPROCESSOR
520
538b
COMPRESSION/
DECOMPRESSION
ENGINE 546
528
538c
534a
RAM
PATTERN
MATCHING
ENGINE 524
534
NVRAM
RANDOM
NUMBER
GENERATOR
542
534b
BUS INTERFACE
UNIT(BIU)
530
ARITHMETIC
ACCELERATOR
544
652

FIG. 9

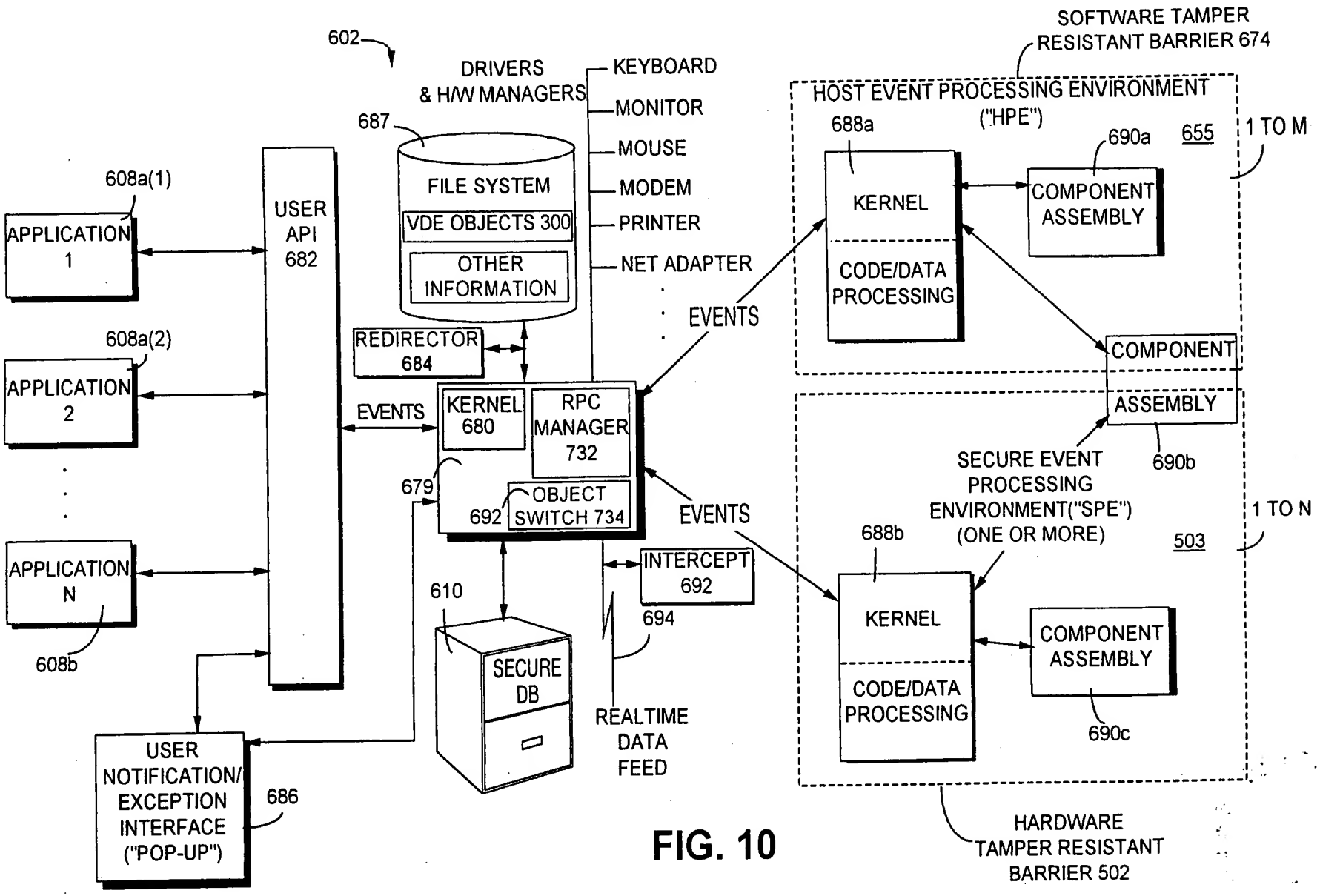

602
DRIVERS
& H/W MANAGERS
KEYBOARD
MONITOR
MOUSE
MODEM
PRINTER
NET ADAPTER
687
FILE SYSTEM
VDE OBJECTS 300
OTHER INFORMATION
REDIRECTOR 684
608a(1)
APPLICATION 1
608a(2)
APPLICATION 2
APPLICATION N
608b
USER API 682
EVENTS
KERNEL 680
RPC MANAGER 732
679
692
OBJECT SWITCH 734
INTERCEPT 692
694
610
SECURE DB
REALTIME DATA FEED
USER NOTIFICATION/ EXCEPTION INTERFACE ("POP-UP")
686
SOFTWARE TAMPER RESISTANT BARRIER 674
HOST EVENT PROCESSING ENVIRONMENT ("HPE")
688a
690a
655
1 TO M
KERNEL
CODE/DATA PROCESSING
COMPONENT ASSEMBLY
COMPONENT ASSEMBLY
690b
SECURE EVENT PROCESSING ENVIRONMENT("SPE") (ONE OR MORE)
503
1 TO N
688b
KERNEL
CODE/DATA PROCESSING
COMPONENT ASSEMBLY
690c
HARDWARE TAMPER RESISTANT BARRIER 502

FIG. 10

FIG. 11A

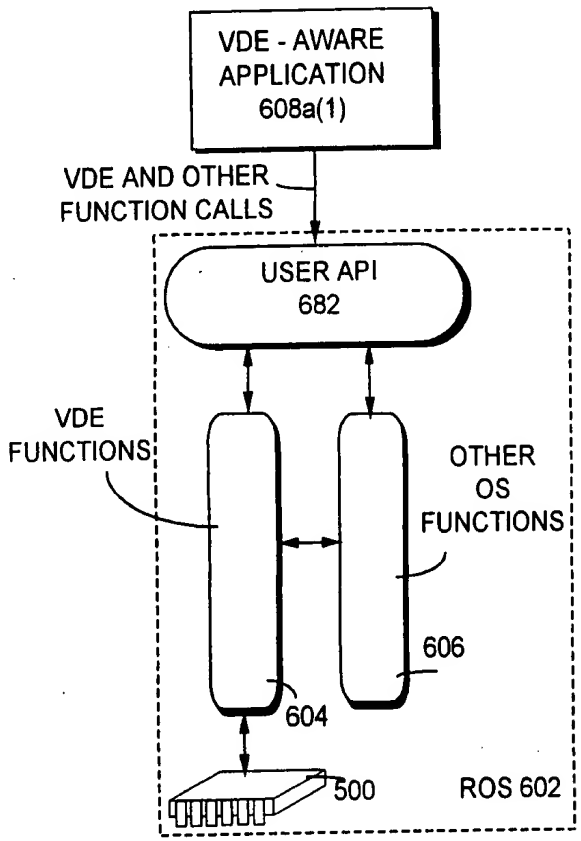


FIG. 11B

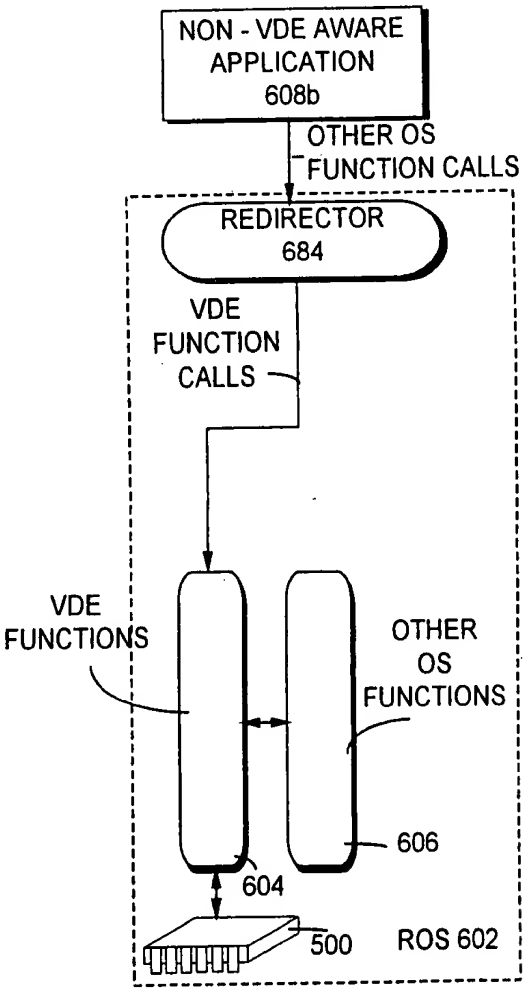
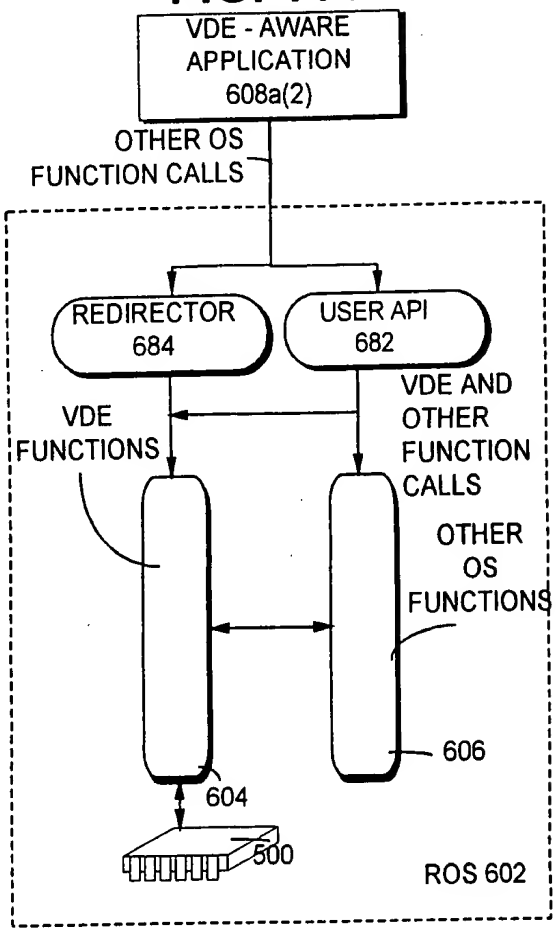


FIG. 11C



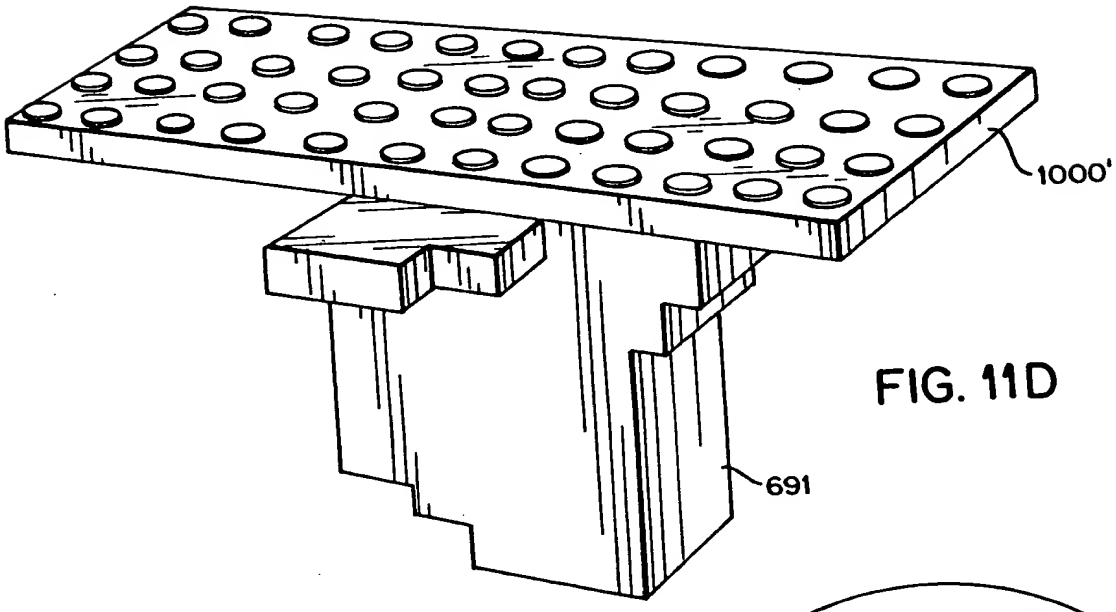


FIG. 11D

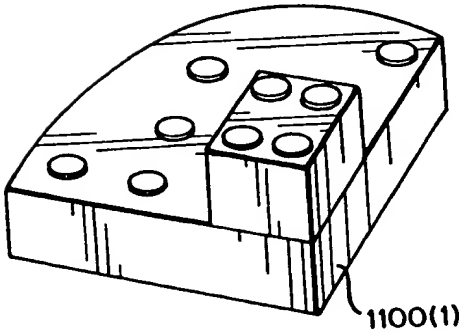


FIG. 11E

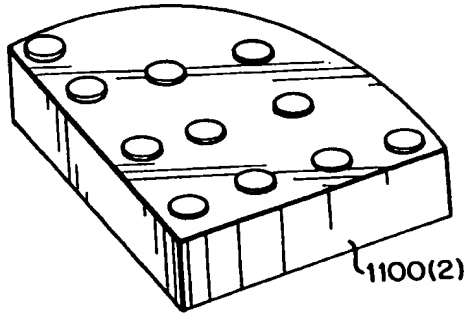


FIG. 11F

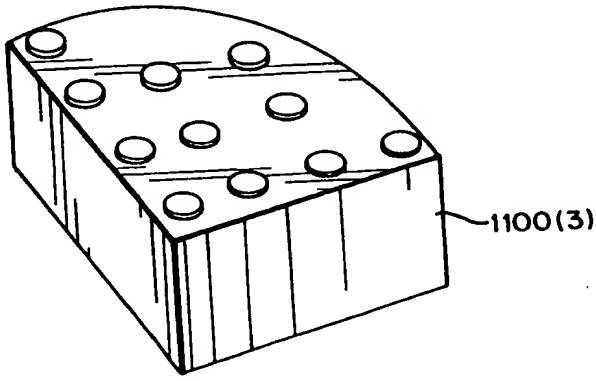


FIG. 11G

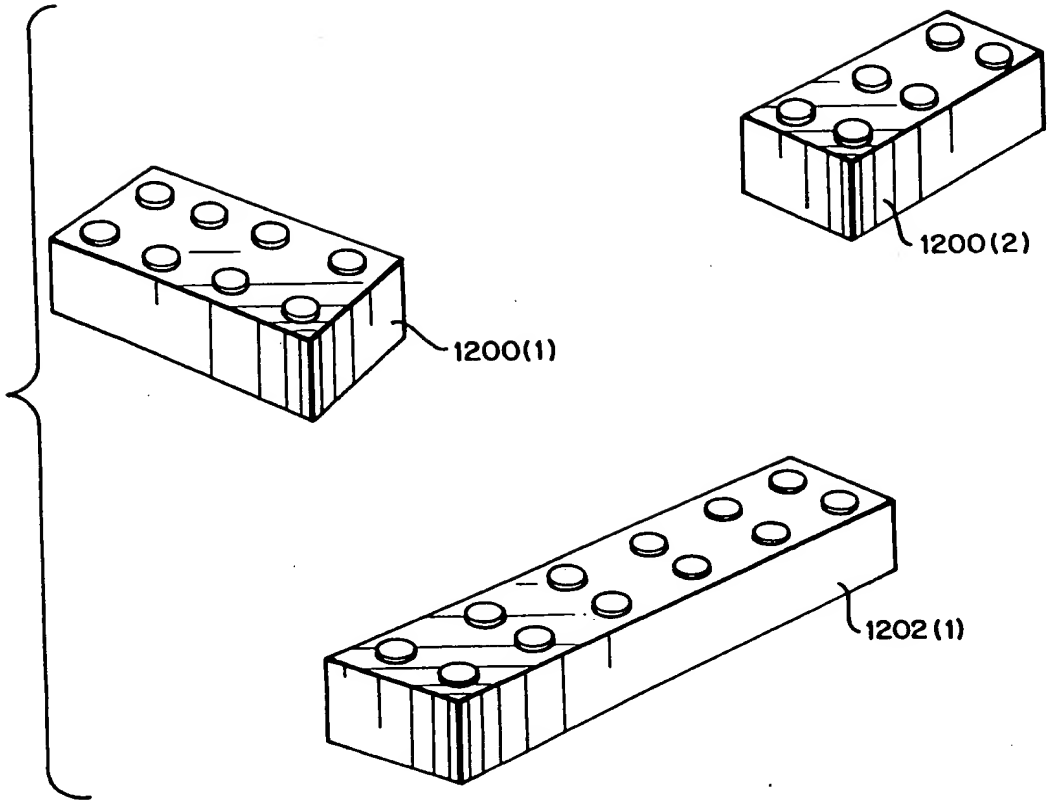
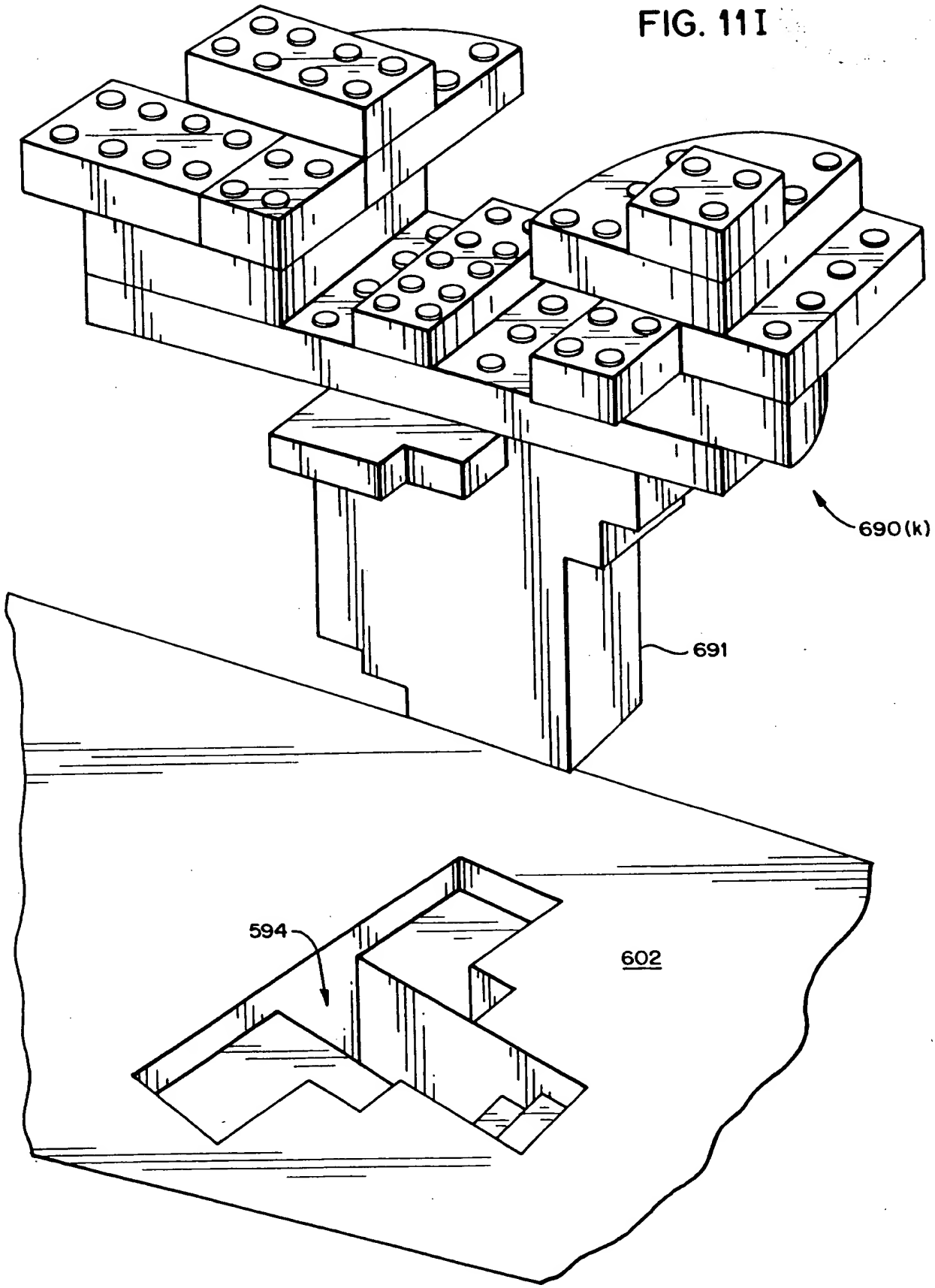


FIG. 11H

FIG. 11I



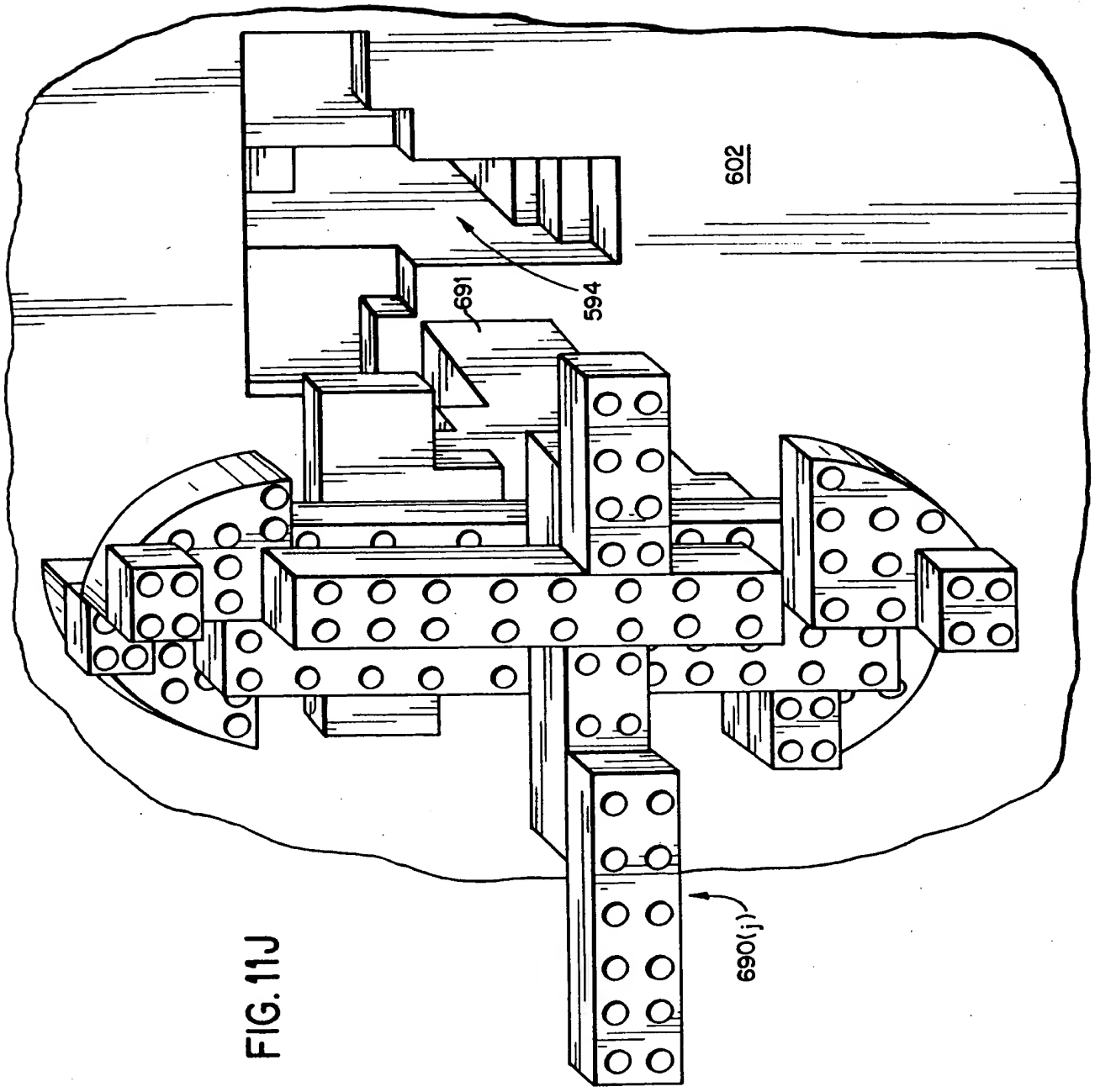


FIG. 11J

FIG. 12

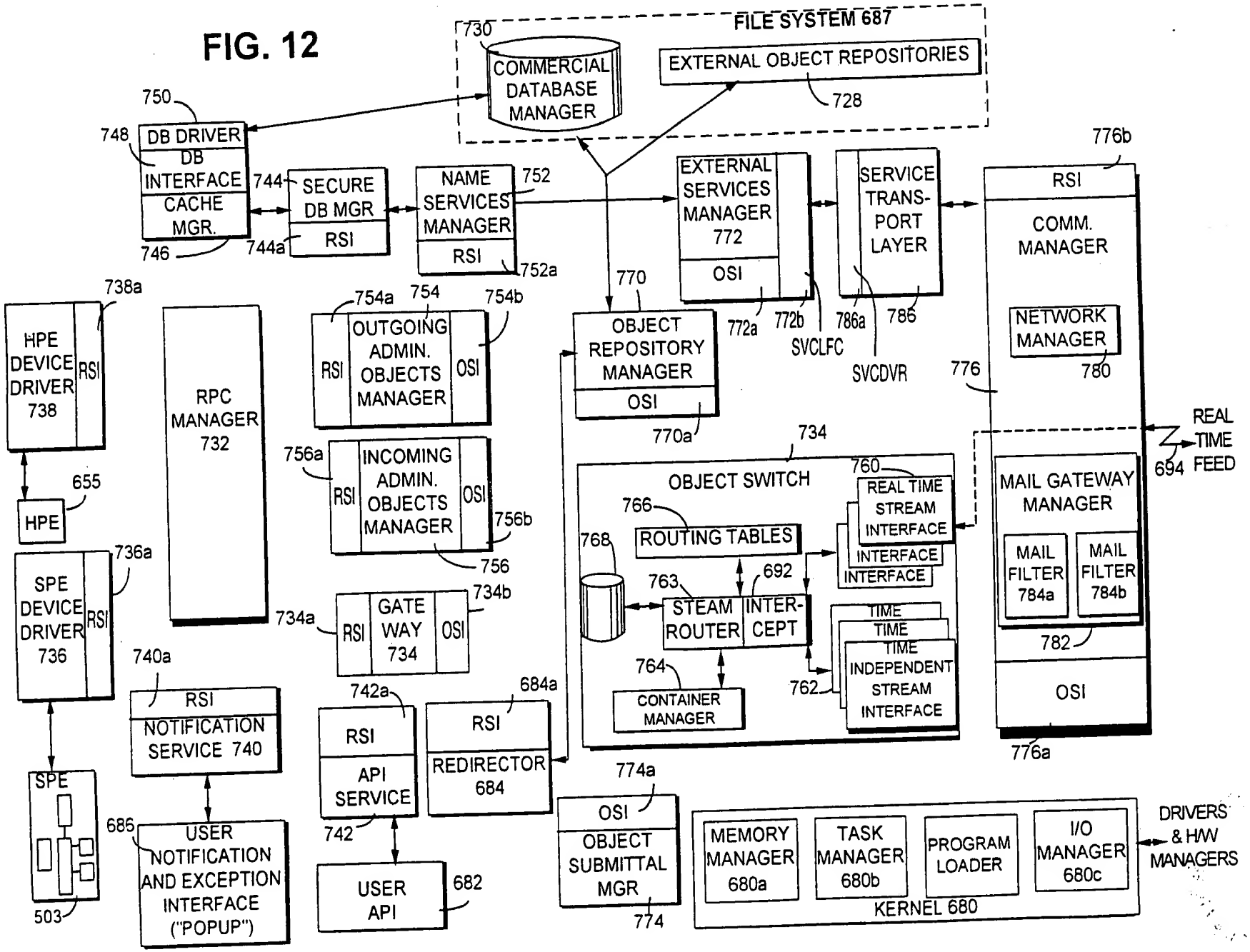

FILE SYSTEM 687
730
COMMERCIAL DATABASE MANAGER
EXTERNAL OBJECT REPOSITORIES
728
750
748
DB DRIVER
DB INTERFACE
CACHE MGR.
746
744
SECURE DB MGR
RSI
744a
NAME SERVICES MANAGER
RSI
752
752a
EXTERNAL SERVICES MANAGER 772
OSI
772a
772b
SVCLFC
SERVICE TRANS-PORT LAYER
786a
786
SVCDVR
776b
RSI
COMM. MANAGER
NETWORK MANAGER
780
776
REAL TIME FEED
694
738a
HPE DEVICE DRIVER 738
RSI
655
HPE
RPC MANAGER 732
754a
754
754b
RSI
OUTGOING ADMIN. OBJECTS MANAGER
OSI
770
OBJECT REPOSITORY MANAGER
OSI
770a
734
OBJECT SWITCH
760
REAL TIME STREAM INTERFACE
INTERFACE
INTERFACE
766
ROUTING TABLES
768
763
692
STEAM ROUTER
INTER-CEPT
764
CONTAINER MANAGER
762
TIME
TIME
TIME INDEPENDENT STREAM INTERFACE
756a
RSI
INCOMING ADMIN. OBJECTS MANAGER
OSI
756b
756
736a
SPE DEVICE DRIVER 736
RSI
734a
RSI
GATE WAY 734
OSI
734b
MAIL GATEWAY MANAGER
MAIL FILTER 784a
MAIL FILTER 784b
782
OSI
776a
740a
RSI
NOTIFICATION SERVICE 740
742a
RSI
API SERVICE
742
684a
RSI
REDIRECTOR 684
774a
OSI
OBJECT SUBMITTAL MGR
774
SPE
503
686
USER NOTIFICATION AND EXCEPTION INTERFACE ("POPUP")
USER API
682
MEMORY MANAGER 680a
TASK MANAGER 680b
PROGRAM LOADER
I/O MANAGER 680c
KERNEL 680
DRIVERS & H/W MANAGERS

FIG. 12A

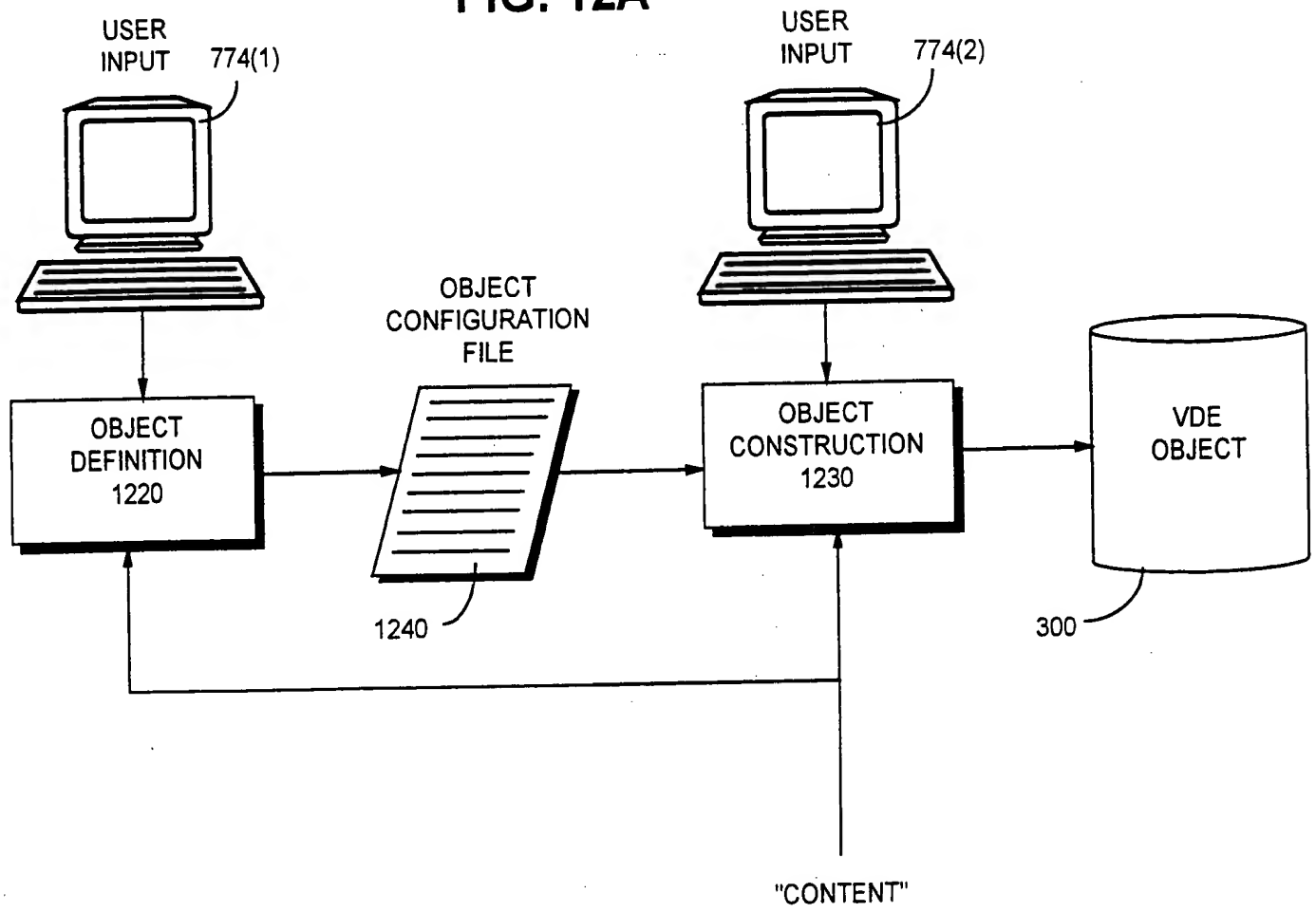

USER INPUT
774(1)
USER INPUT
774(2)
OBJECT CONFIGURATION FILE
OBJECT DEFINITION 1220
OBJECT CONSTRUCTION 1230
VDE OBJECT
1240
300
"CONTENT"

FIG. 13

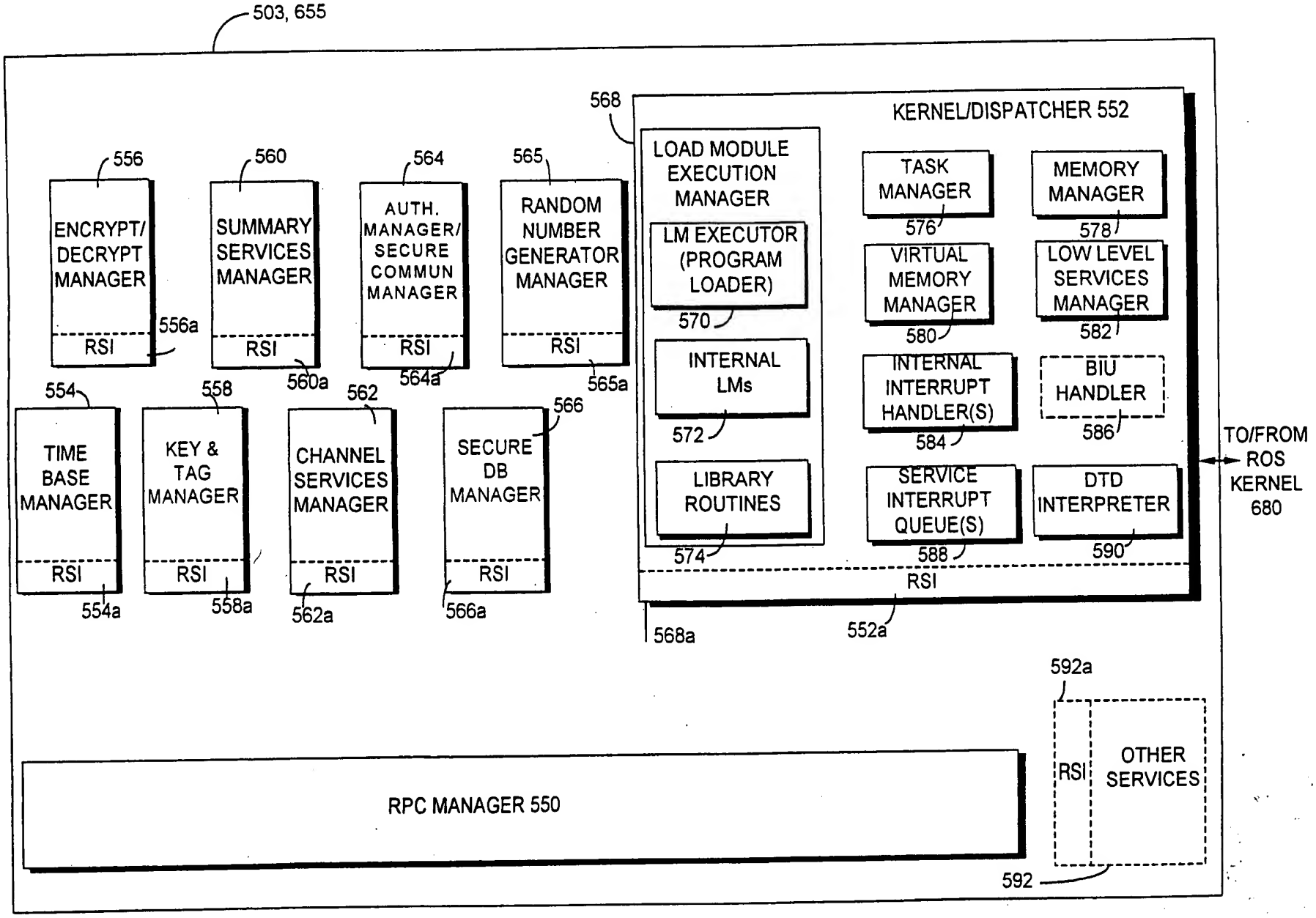

503, 655
568
KERNEL/DISPATCHER 552
LOAD MODULE EXECUTION MANAGER
LM EXECUTOR (PROGRAM LOADER)
570
INTERNAL LMs
572
LIBRARY ROUTINES
574
TASK MANAGER
576
MEMORY MANAGER
578
VIRTUAL MEMORY MANAGER
580
LOW LEVEL SERVICES MANAGER
582
INTERNAL INTERRUPT HANDLER(S)
584
BIU HANDLER
586
SERVICE INTERRUPT QUEUE(S)
588
DTD INTERPRETER
590
RSI
568a
552a
TO/FROM ROS KERNEL 680
556
ENCRYPT/ DECRYPT MANAGER
556a
RSI
560
SUMMARY SERVICES MANAGER
560a
564
AUTH. MANAGER/ SECURE COMMUN MANAGER
564a
565
RANDOM NUMBER GENERATOR MANAGER
565a
554
TIME BASE MANAGER
554a
558
KEY & TAG MANAGER
558a
562
CHANNEL SERVICES MANAGER
562a
566
SECURE DB MANAGER
566a
RPC MANAGER 550
592a
RSI
OTHER SERVICES
592

FIG. 14A

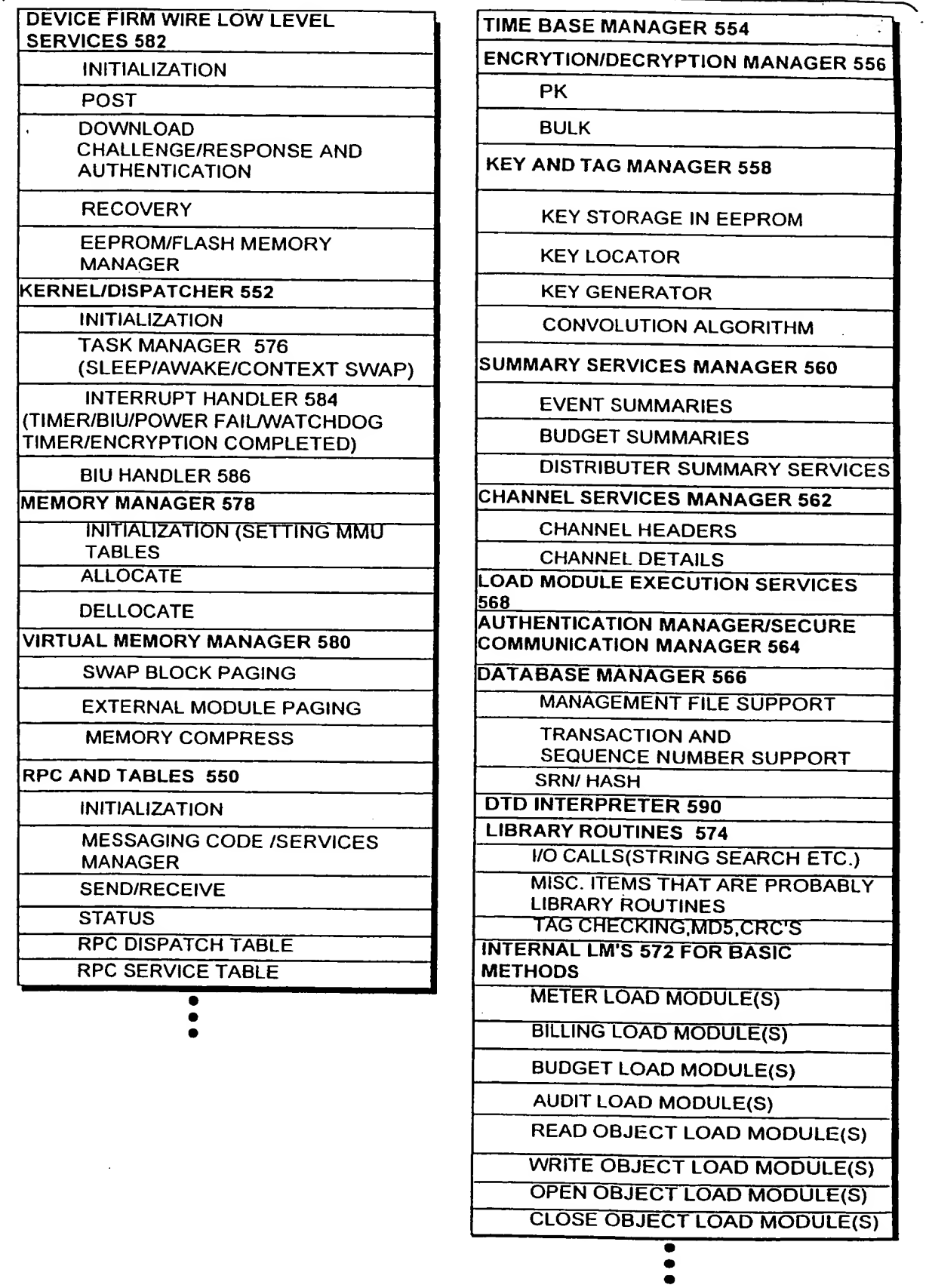

DEVICE FIRM WIRE LOW LEVEL SERVICES 582
INITIALIZATION
POST
DOWNLOAD CHALLENGE/RESPONSE AND AUTHENTICATION
RECOVERY
EEPROM/FLASH MEMORY MANAGER
KERNEL/DISPATCHER 552
INITIALIZATION
TASK MANAGER 576 (SLEEP/AWAKE/CONTEXT SWAP)
INTERRUPT HANDLER 584 (TIMER/BIU/POWER FAIL/WATCHDOG TIMER/ENCRYPTION COMPLETED)
BIU HANDLER 586
MEMORY MANAGER 578
INITIALIZATION (SETTING MMU TABLES
ALLOCATE
DELLOCATE
VIRTUAL MEMORY MANAGER 580
SWAP BLOCK PAGING
EXTERNAL MODULE PAGING
MEMORY COMPRESS
RPC AND TABLES 550
INITIALIZATION
MESSAGING CODE /SERVICES MANAGER
SEND/RECEIVE
STATUS
RPC DISPATCH TABLE
RPC SERVICE TABLE
TIME BASE MANAGER 554
ENCRYTION/DECRYPTION MANAGER 556
PK
BULK
KEY AND TAG MANAGER 558
KEY STORAGE IN EEPROM
KEY LOCATOR
KEY GENERATOR
CONVOLUTION ALGORITHM
SUMMARY SERVICES MANAGER 560
EVENT SUMMARIES
BUDGET SUMMARIES
DISTRIBUTER SUMMARY SERVICES
CHANNEL SERVICES MANAGER 562
CHANNEL HEADERS
CHANNEL DETAILS
LOAD MODULE EXECUTION SERVICES 568
AUTHENTICATION MANAGER/SECURE COMMUNICATION MANAGER 564
DATABASE MANAGER 566
MANAGEMENT FILE SUPPORT
TRANSACTION AND SEQUENCE NUMBER SUPPORT
SRN/ HASH
DTD INTERPRETER 590
LIBRARY ROUTINES 574
I/O CALLS(STRING SEARCH ETC.)
MISC. ITEMS THAT ARE PROBABLY LIBRARY ROUTINES
TAG CHECKING,MD5,CRC'S
INTERNAL LM'S 572 FOR BASIC METHODS
METER LOAD MODULE(S)
BILLING LOAD MODULE(S)
BUDGET LOAD MODULE(S)
AUDIT LOAD MODULE(S)
READ OBJECT LOAD MODULE(S)
WRITE OBJECT LOAD MODULE(S)
OPEN OBJECT LOAD MODULE(S)
CLOSE OBJECT LOAD MODULE(S)

FIG. 14B

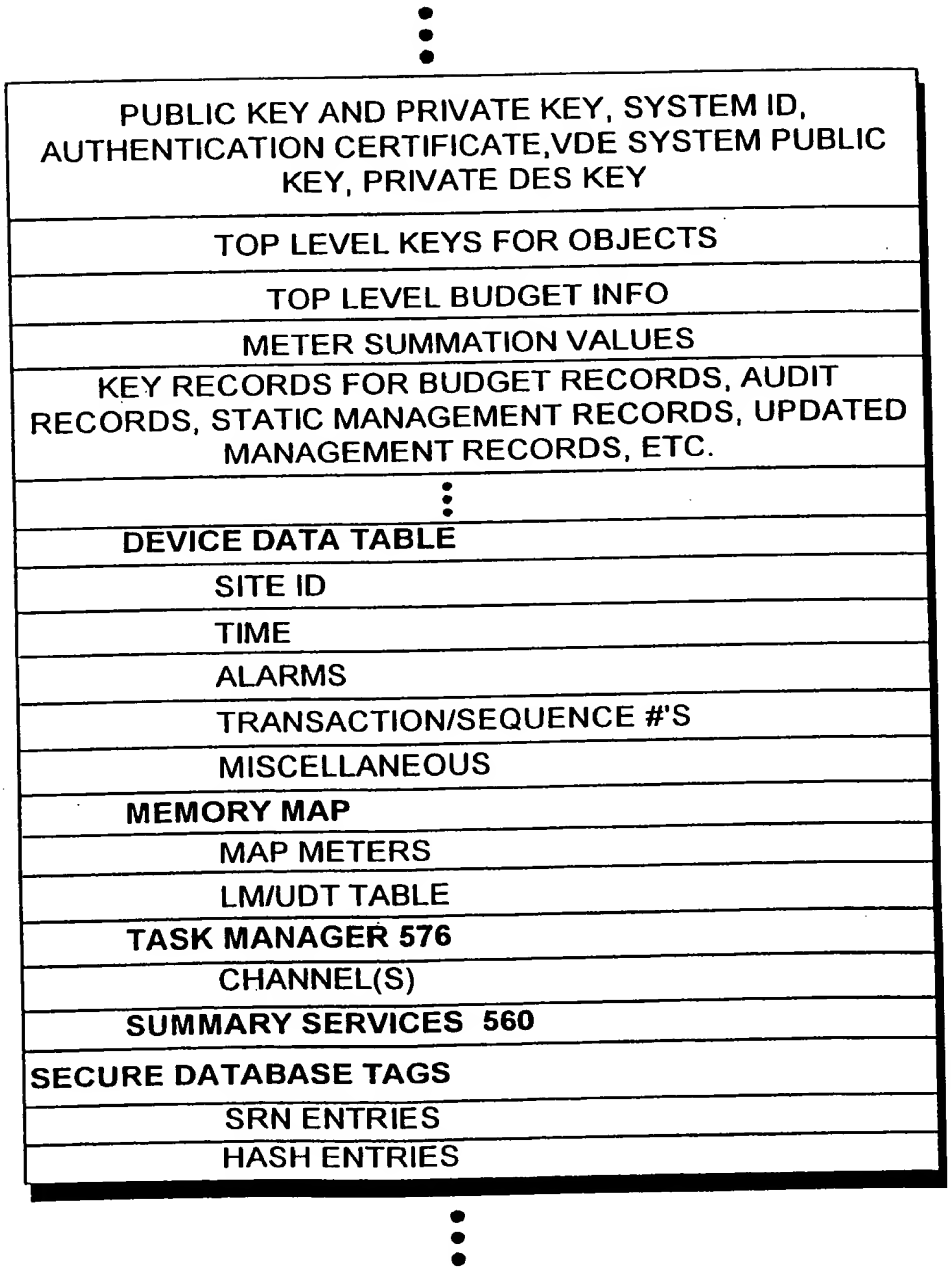
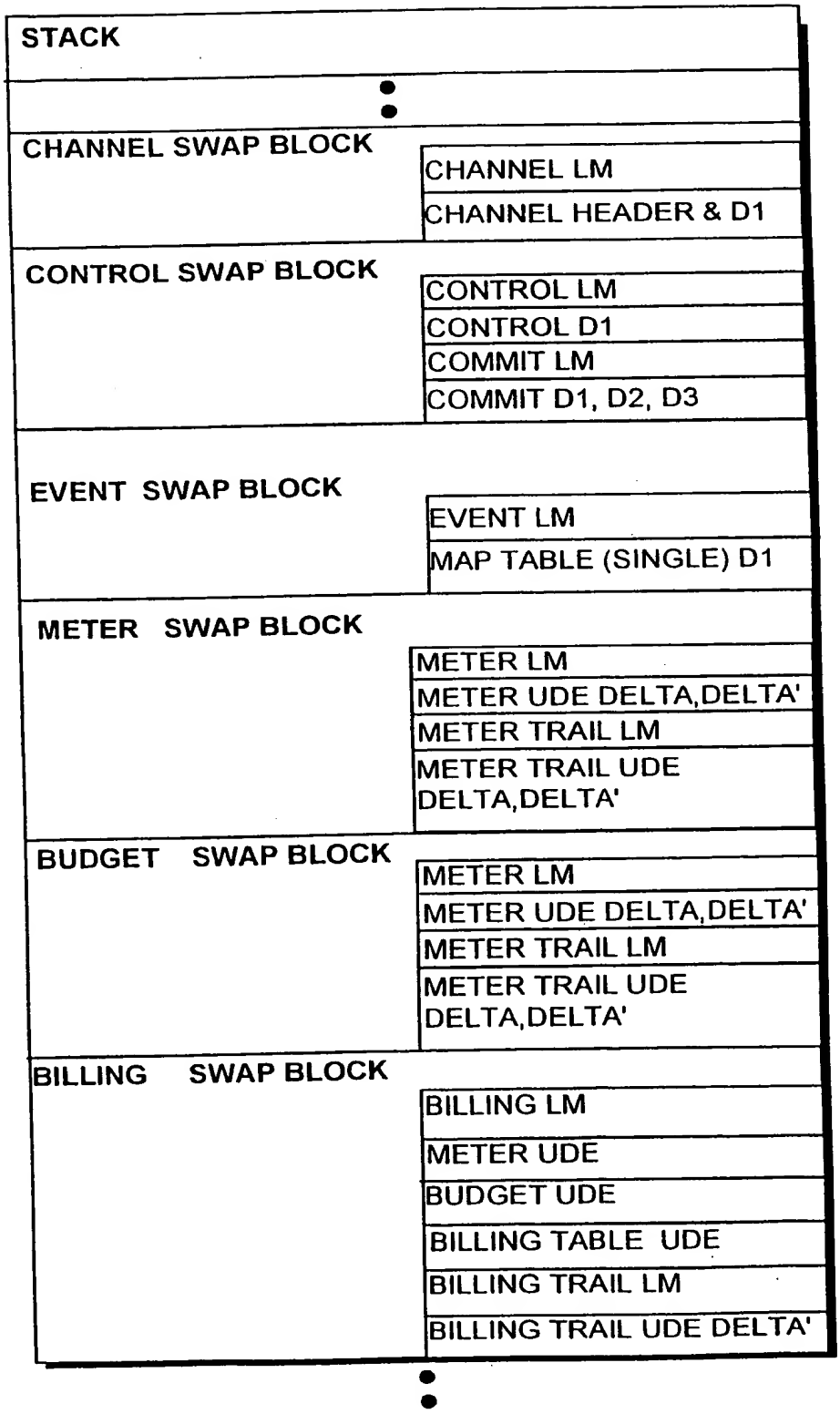

PUBLIC KEY AND PRIVATE KEY, SYSTEM ID, AUTHENTICATION CERTIFICATE,VDE SYSTEM PUBLIC KEY, PRIVATE DES KEY
TOP LEVEL KEYS FOR OBJECTS
TOP LEVEL BUDGET INFO
METER SUMMATION VALUES
KEY RECORDS FOR BUDGET RECORDS, AUDIT RECORDS, STATIC MANAGEMENT RECORDS, UPDATED MANAGEMENT RECORDS, ETC.
DEVICE DATA TABLE
SITE ID
TIME
ALARMS
TRANSACTION/SEQUENCE #'S
MISCELLANEOUS
MEMORY MAP
MAP METERS
LM/UDT TABLE
TASK MANAGER 576
CHANNEL(S)
SUMMARY SERVICES 560
SECURE DATABASE TAGS
SRN ENTRIES
HASH ENTRIES

FIG. 14C


STACK
CHANNEL SWAP BLOCK
CHANNEL LM
CHANNEL HEADER & D1
CONTROL SWAP BLOCK
CONTROL LM
CONTROL D1
COMMIT LM
COMMIT D1, D2, D3
EVENT SWAP BLOCK
EVENT LM
MAP TABLE (SINGLE) D1
METER SWAP BLOCK
METER LM
METER UDE DELTA,DELTA'
METER TRAIL LM
METER TRAIL UDE DELTA,DELTA'
BUDGET SWAP BLOCK
METER LM
METER UDE DELTA,DELTA'
METER TRAIL LM
METER TRAIL UDE DELTA,DELTA'
BILLING SWAP BLOCK
BILLING LM
METER UDE
BUDGET UDE
BILLING TABLE UDE
BILLING TRAIL LM
BILLING TRAIL UDE DELTA'

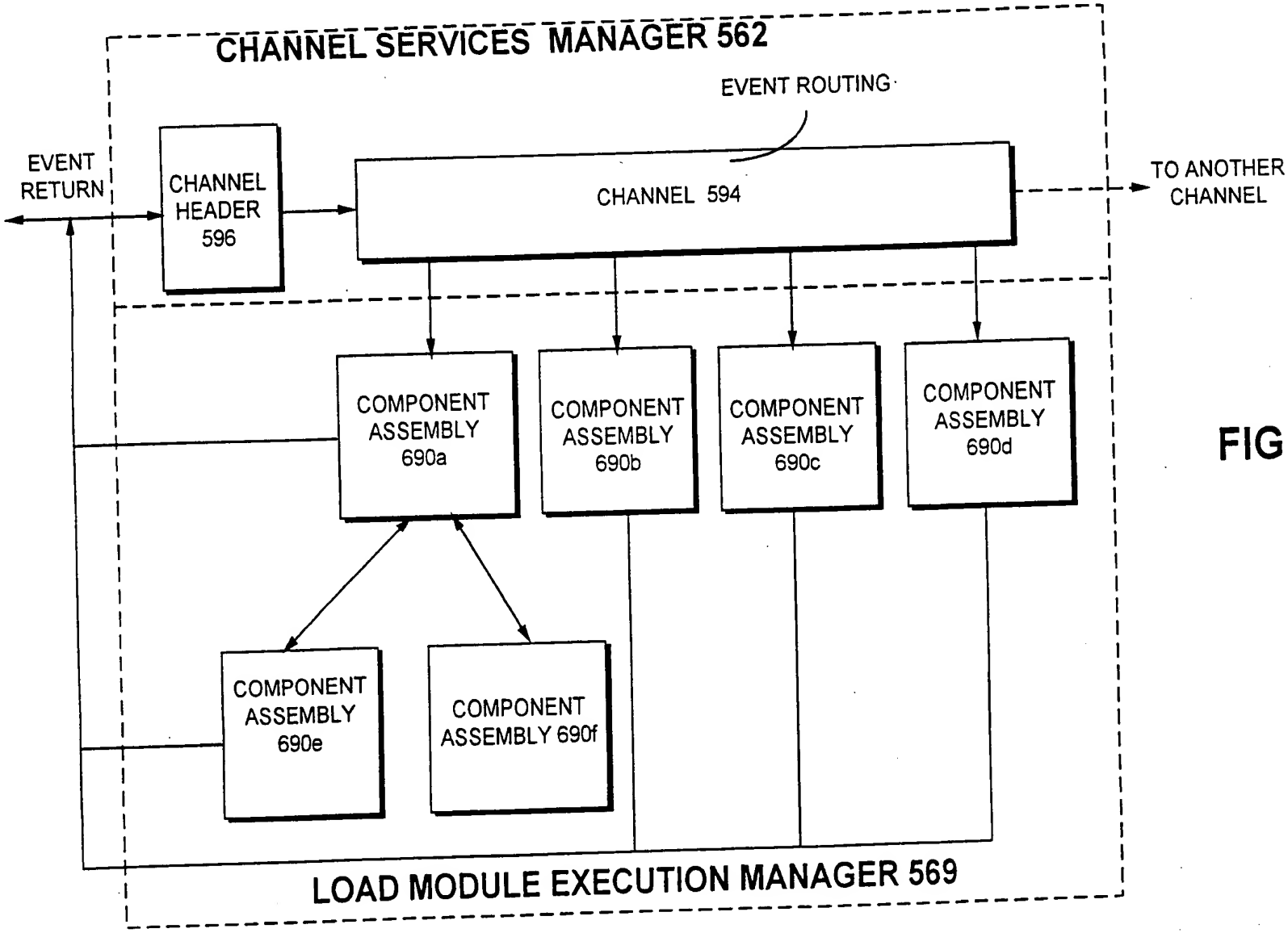

CHANNEL SERVICES MANAGER 562
EVENT ROUTING
EVENT RETURN
CHANNEL HEADER 596
CHANNEL 594
TO ANOTHER CHANNEL
COMPONENT ASSEMBLY 690a
COMPONENT ASSEMBLY 690b
COMPONENT ASSEMBLY 690c
COMPONENT ASSEMBLY 690d
COMPONENT ASSEMBLY 690e
COMPONENT ASSEMBLY 690f
LOAD MODULE EXECUTION MANAGER 569

FIG. 15

FIG. 15A

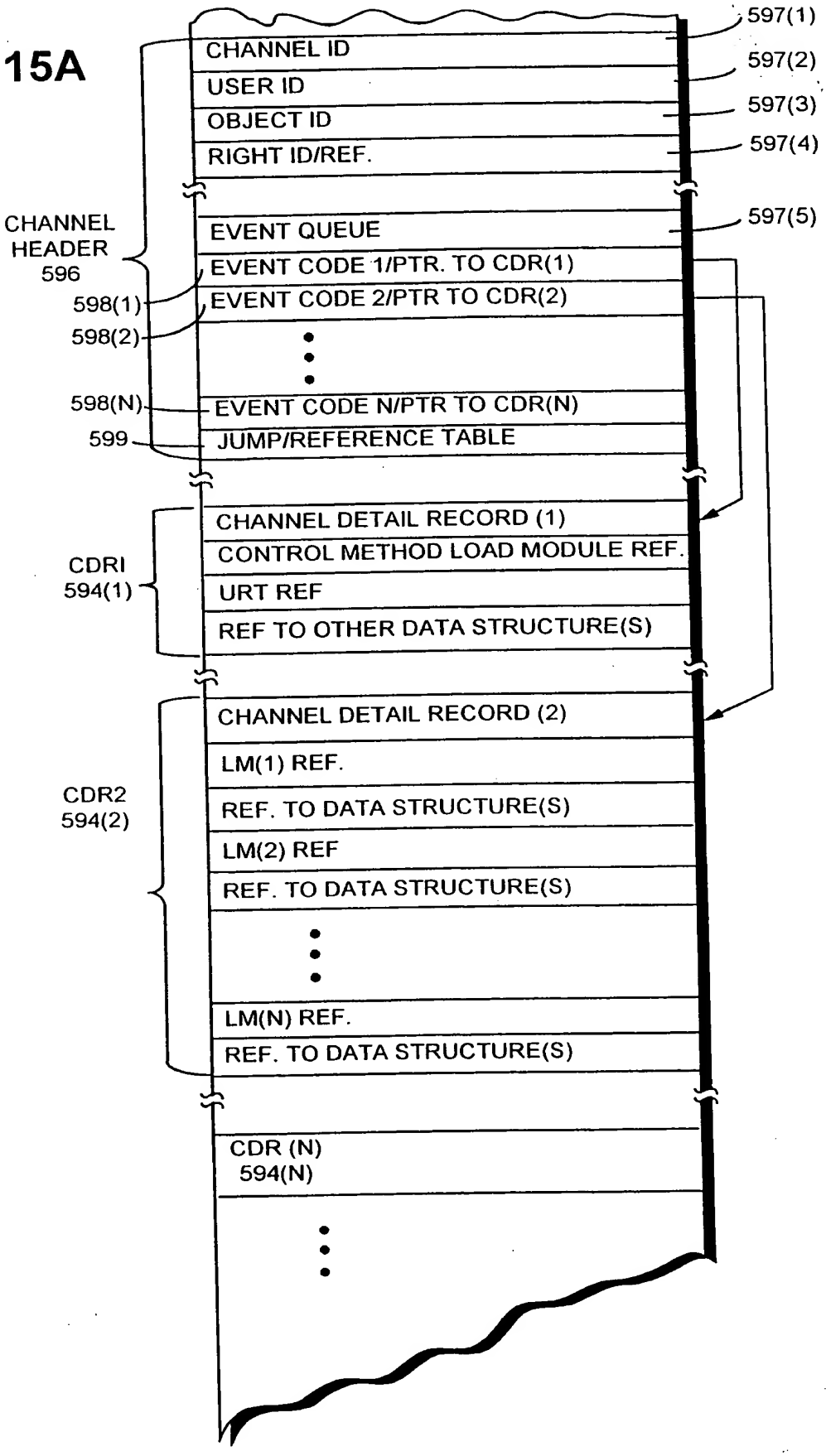

597(1)
CHANNEL ID
597(2)
USER ID
597(3)
OBJECT ID
597(4)
RIGHT ID/REF.
597(5)
EVENT QUEUE
CHANNEL HEADER 596
EVENT CODE 1/PTR. TO CDR(1)
598(1)
EVENT CODE 2/PTR TO CDR(2)
598(2)
598(N)
EVENT CODE N/PTR TO CDR(N)
599
JUMP/REFERENCE TABLE
CHANNEL DETAIL RECORD (1)
CDRI 594(1)
CONTROL METHOD LOAD MODULE REF.
URT REF
REF TO OTHER DATA STRUCTURE(S)
CHANNEL DETAIL RECORD (2)
LM(1) REF.
CDR2 594(2)
REF. TO DATA STRUCTURE(S)
LM(2) REF
REF. TO DATA STRUCTURE(S)
LM(N) REF.
REF. TO DATA STRUCTURE(S)
CDR (N) 594(N)

FIG. 15B

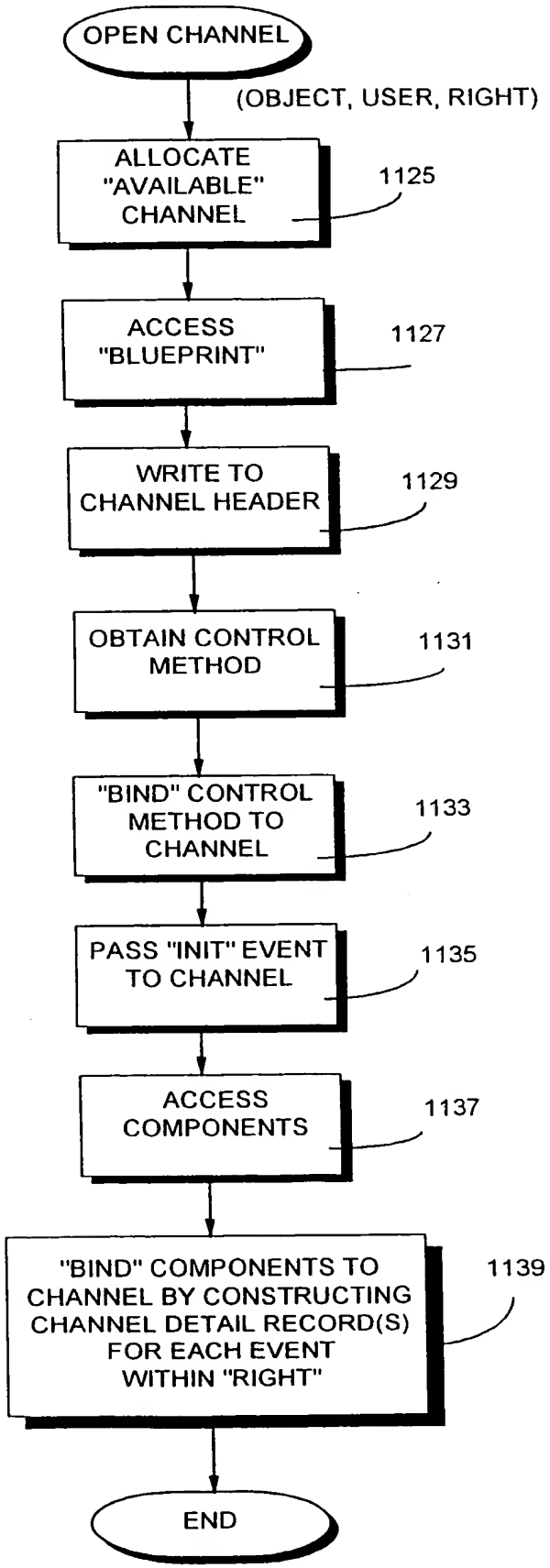
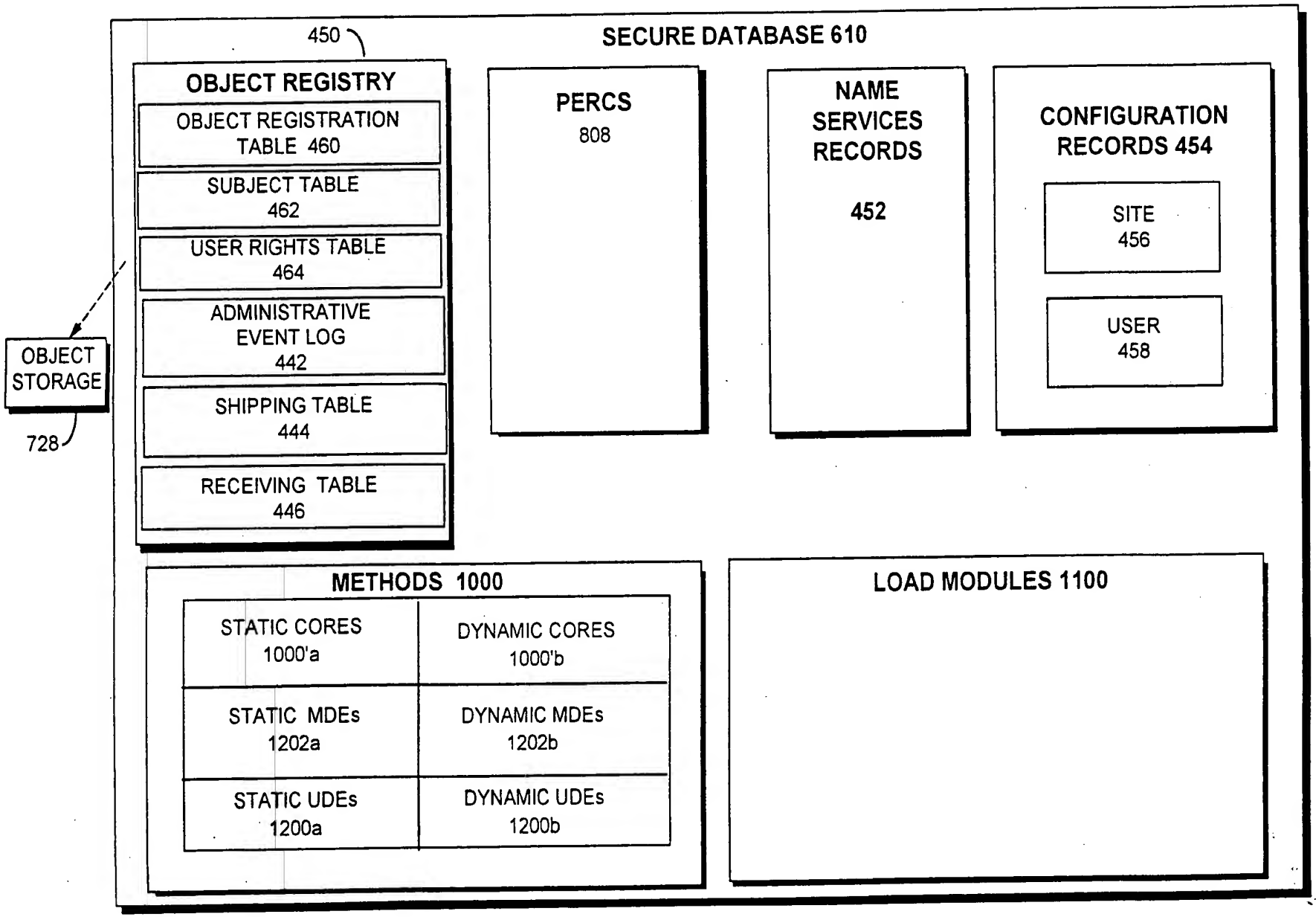

OPEN CHANNEL
(OBJECT, USER, RIGHT)
ALLOCATE "AVAILABLE" CHANNEL
1125
ACCESS "BLUEPRINT"
1127
WRITE TO CHANNEL HEADER
1129
OBTAIN CONTROL METHOD
1131
"BIND" CONTROL METHOD TO CHANNEL
1133
PASS "INIT" EVENT TO CHANNEL
1135
ACCESS COMPONENTS
1137
"BIND" COMPONENTS TO CHANNEL BY CONSTRUCTING CHANNEL DETAIL RECORD(S) FOR EACH EVENT WITHIN "RIGHT"
1139
END

FIG. 16


SECURE DATABASE 610
450
OBJECT REGISTRY
OBJECT REGISTRATION TABLE 460
SUBJECT TABLE 462
USER RIGHTS TABLE 464
ADMINISTRATIVE EVENT LOG 442
SHIPPING TABLE 444
RECEIVING TABLE 446
OBJECT STORAGE
728
PERCS 808
NAME SERVICES RECORDS 452
CONFIGURATION RECORDS 454
SITE 456
USER 458
METHODS 1000
STATIC CORES 1000'a
DYNAMIC CORES 1000'b
STATIC MDEs 1202a
DYNAMIC MDEs 1202b
STATIC UDEs 1200a
DYNAMIC UDEs 1200b
LOAD MODULES 1100

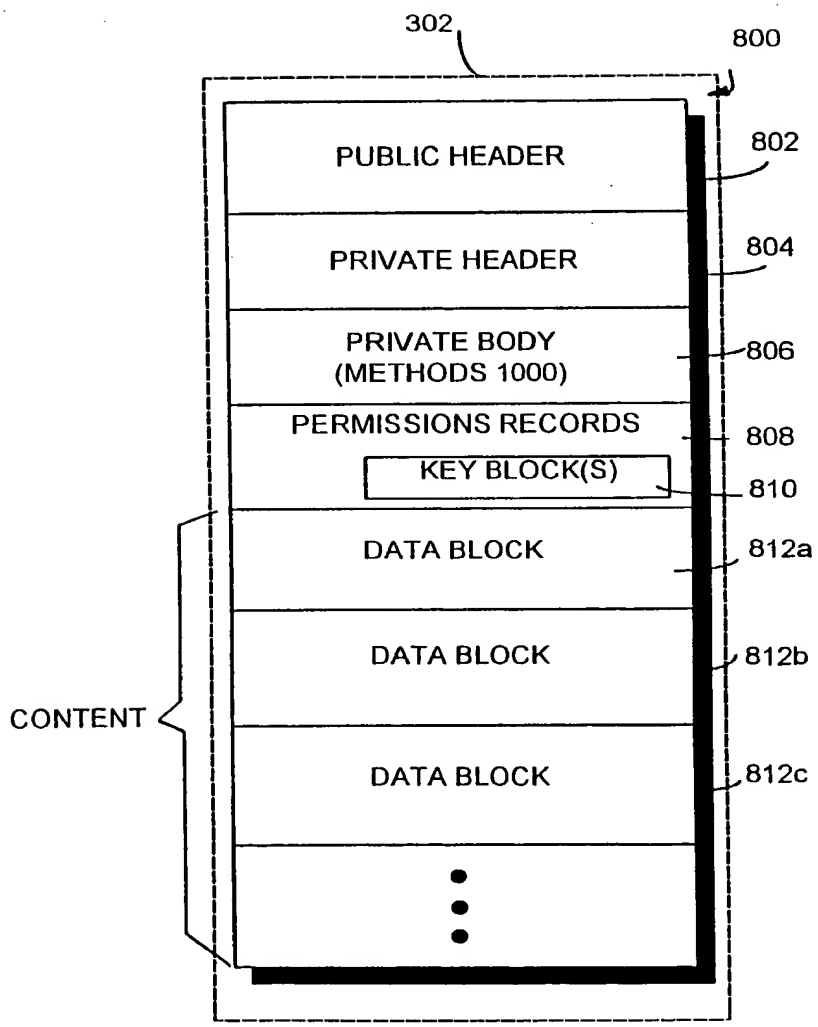

302
800
PUBLIC HEADER
802
PRIVATE HEADER
804
PRIVATE BODY
(METHODS 1000)
806
PERMISSIONS RECORDS
808
KEY BLOCK(S)
810
DATA BLOCK
812a
DATA BLOCK
812b
DATA BLOCK
812c
CONTENT

FIG. 17

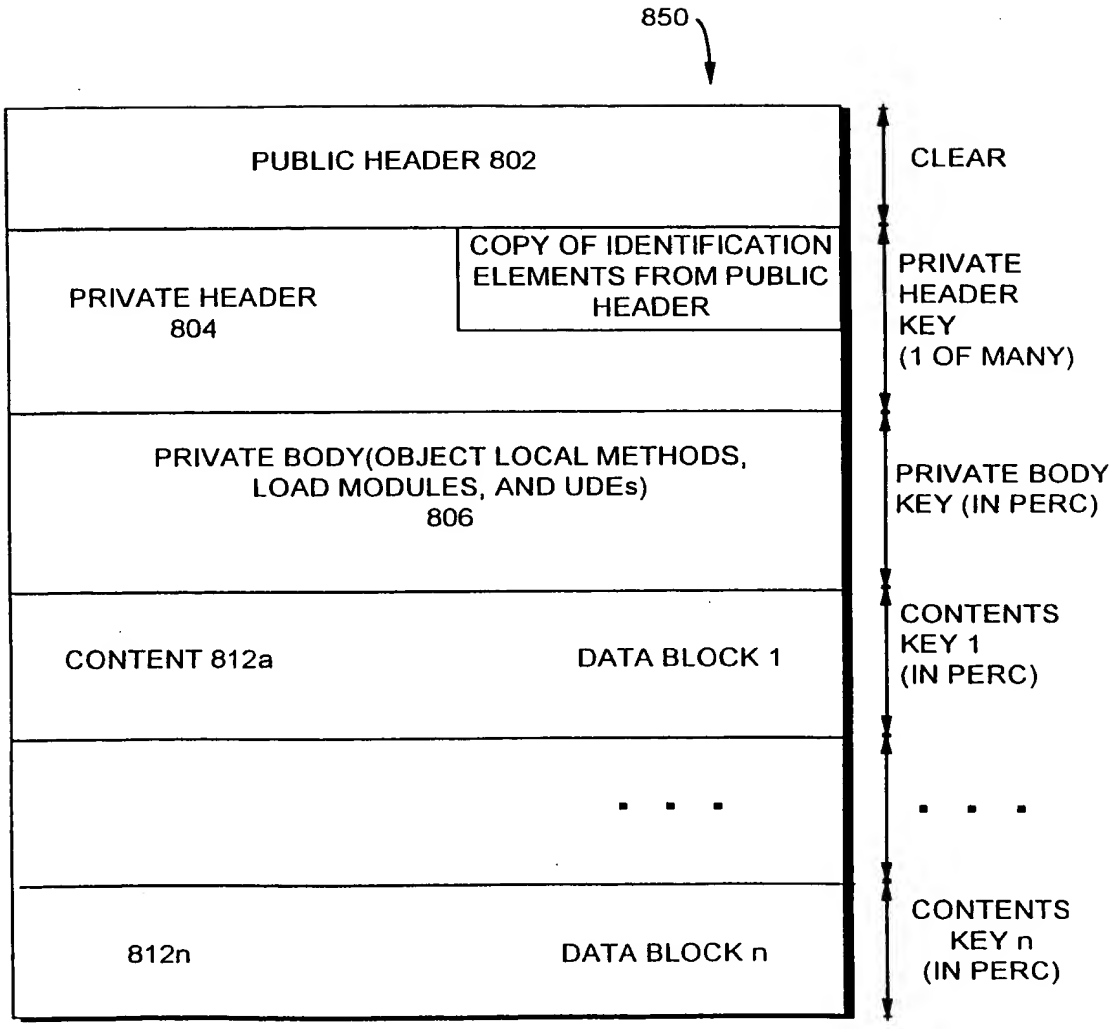

850
PUBLIC HEADER 802
COPY OF IDENTIFICATION ELEMENTS FROM PUBLIC HEADER
PRIVATE HEADER 804
PRIVATE BODY(OBJECT LOCAL METHODS, LOAD MODULES, AND UDEs) 806
CONTENT 812a
DATA BLOCK 1
812n
DATA BLOCK n
CLEAR
PRIVATE HEADER KEY (1 OF MANY)
PRIVATE BODY KEY (IN PERC)
CONTENTS KEY 1 (IN PERC)
CONTENTS KEY n (IN PERC)

FIG. 18

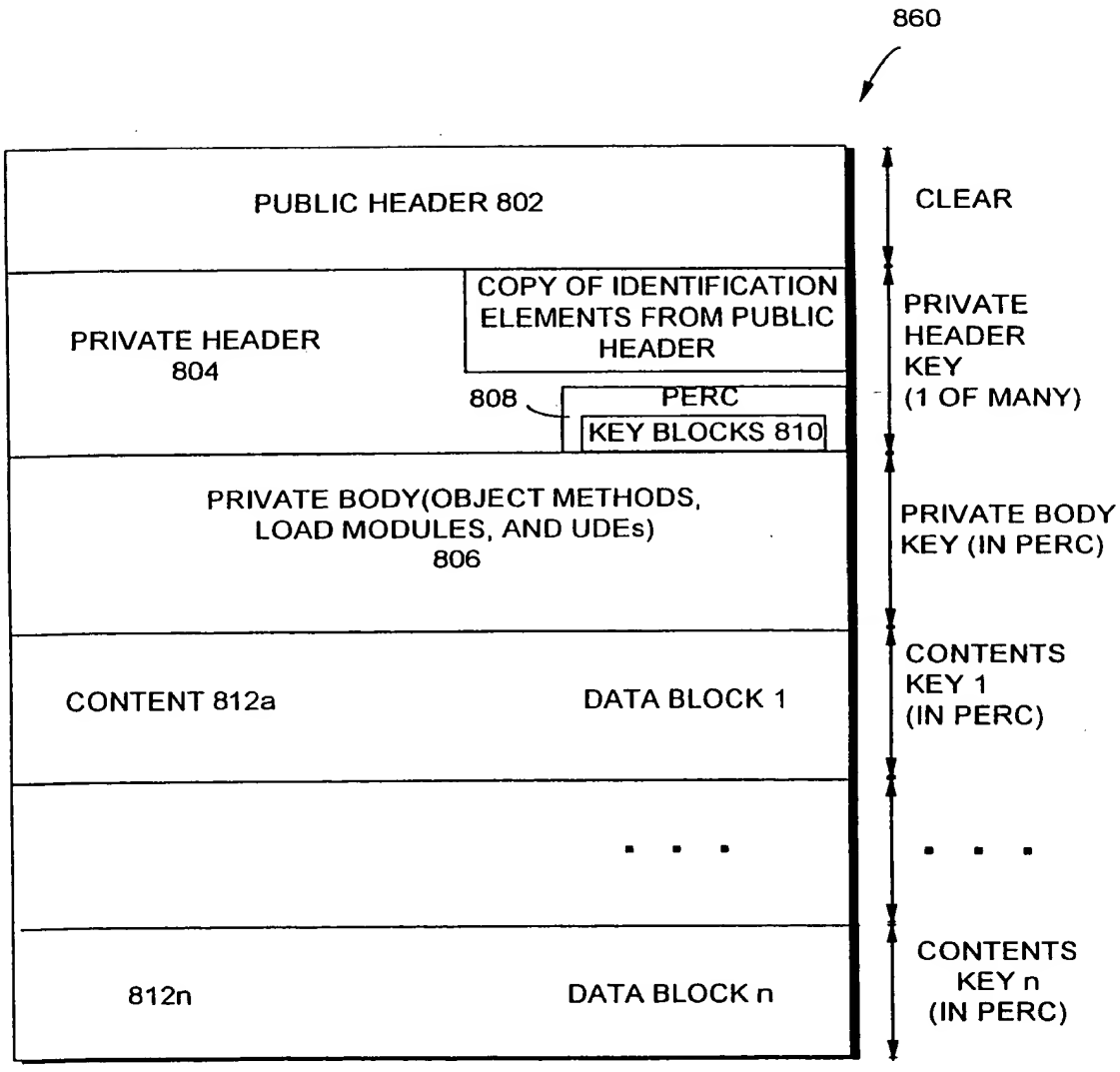

860
PUBLIC HEADER 802
PRIVATE HEADER
804
COPY OF IDENTIFICATION ELEMENTS FROM PUBLIC HEADER
808
PERC
KEY BLOCKS 810
PRIVATE BODY(OBJECT METHODS, LOAD MODULES, AND UDEs)
806
CONTENT 812a
DATA BLOCK 1
812n
DATA BLOCK n
CLEAR
PRIVATE HEADER KEY (1 OF MANY)
PRIVATE BODY KEY (IN PERC)
CONTENTS KEY 1 (IN PERC)
CONTENTS KEY n (IN PERC)

FIG. 19

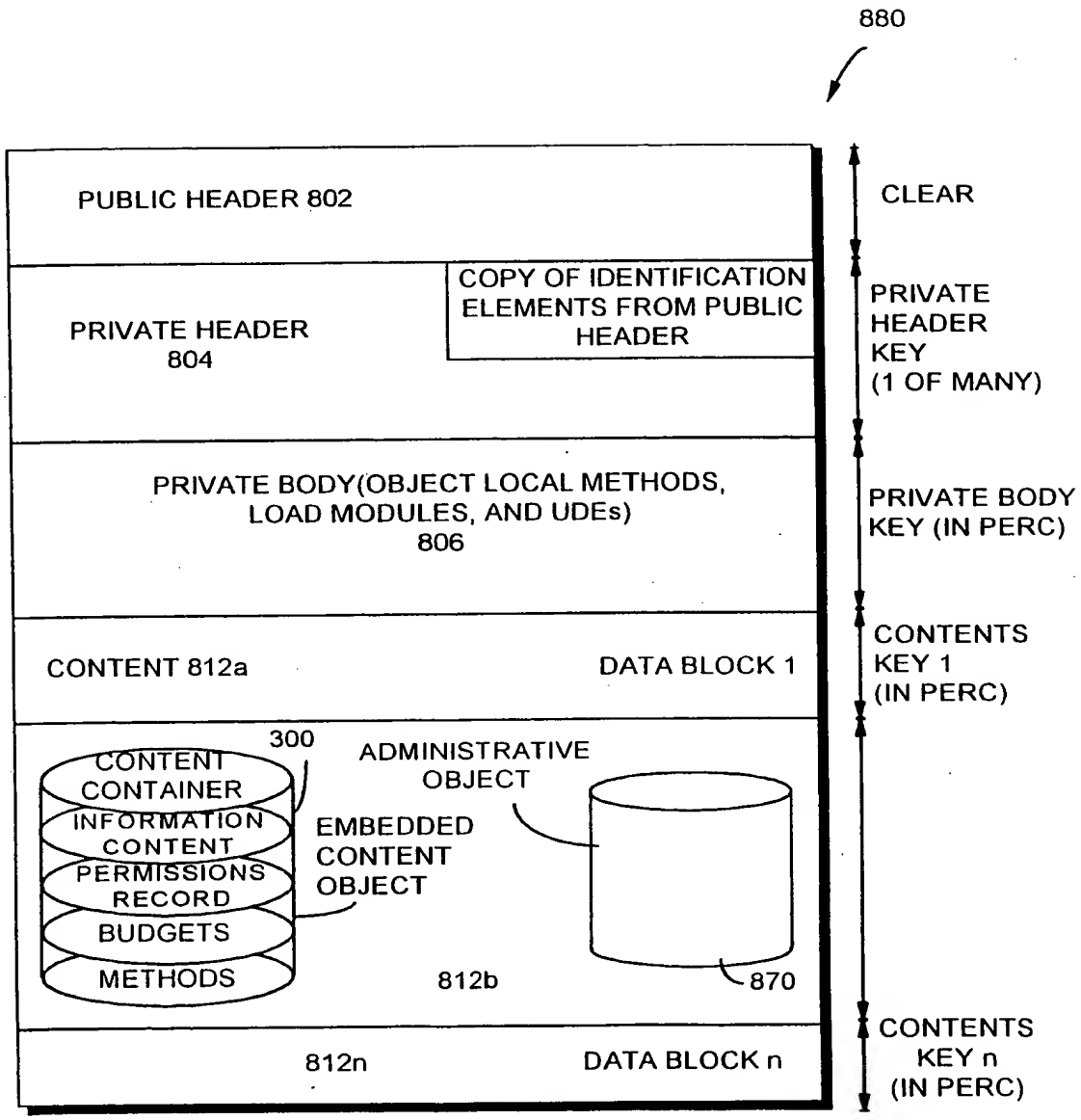

880
PUBLIC HEADER 802
CLEAR
PRIVATE HEADER 804
COPY OF IDENTIFICATION ELEMENTS FROM PUBLIC HEADER
PRIVATE HEADER KEY (1 OF MANY)
PRIVATE BODY(OBJECT LOCAL METHODS, LOAD MODULES, AND UDEs) 806
PRIVATE BODY KEY (IN PERC)
CONTENT 812a
DATA BLOCK 1
CONTENTS KEY 1 (IN PERC)
300
CONTENT CONTAINER
INFORMATION CONTENT
PERMISSIONS RECORD
BUDGETS
METHODS
EMBEDDED CONTENT OBJECT
ADMINISTRATIVE OBJECT
812b
870
812n
DATA BLOCK n
CONTENTS KEY n (IN PERC)

FIG. 20

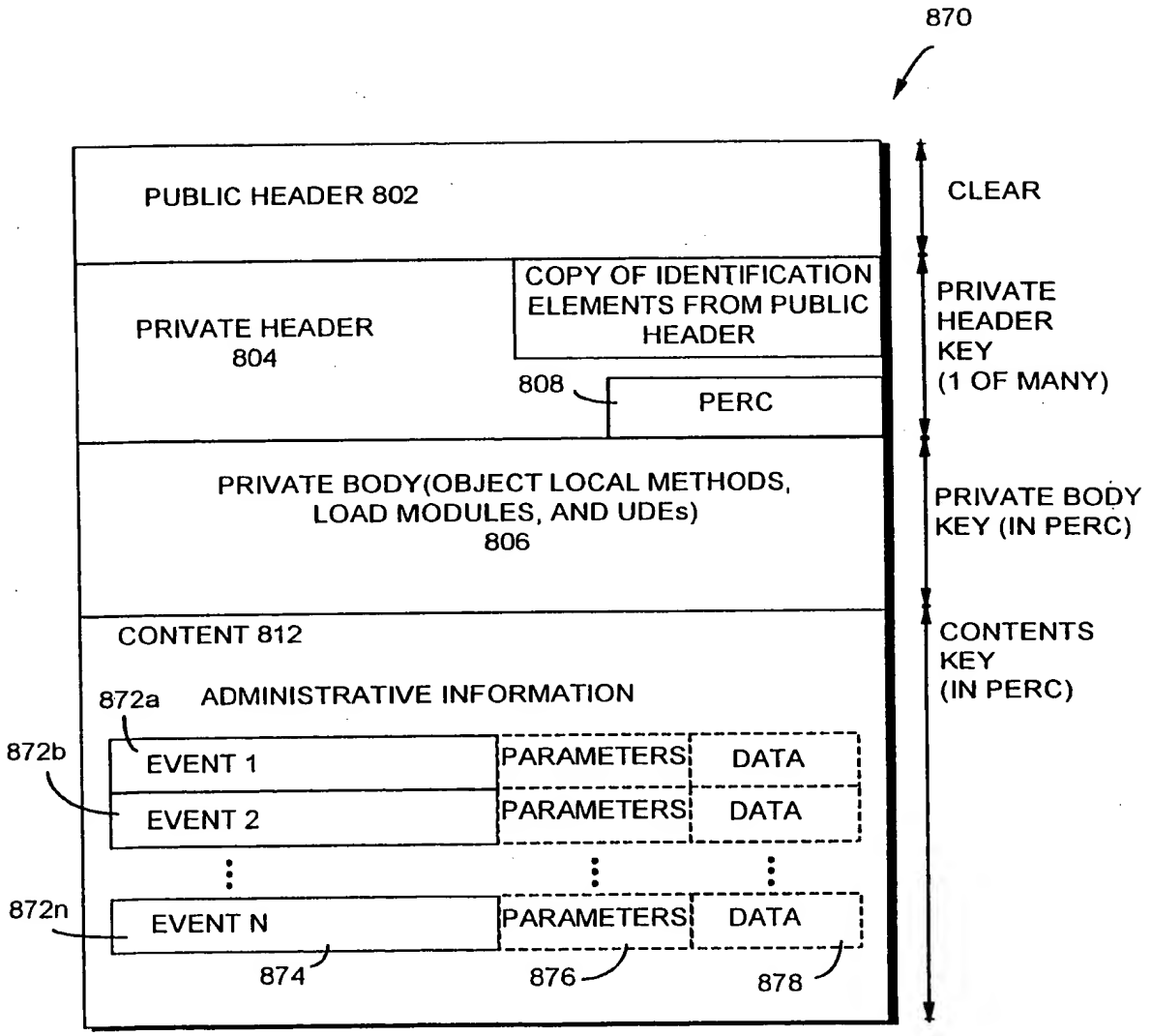

870
PUBLIC HEADER 802
PRIVATE HEADER
804
COPY OF IDENTIFICATION ELEMENTS FROM PUBLIC HEADER
808
PERC
PRIVATE BODY(OBJECT LOCAL METHODS, LOAD MODULES, AND UDEs)
806
CONTENT 812
872a
ADMINISTRATIVE INFORMATION
872b
EVENT 1
PARAMETERS
DATA
EVENT 2
PARAMETERS
DATA
872n
EVENT N
PARAMETERS
DATA
874
876
878
CLEAR
PRIVATE HEADER KEY (1 OF MANY)
PRIVATE BODY KEY (IN PERC)
CONTENTS KEY (IN PERC)

FIG. 21

FIG. 22

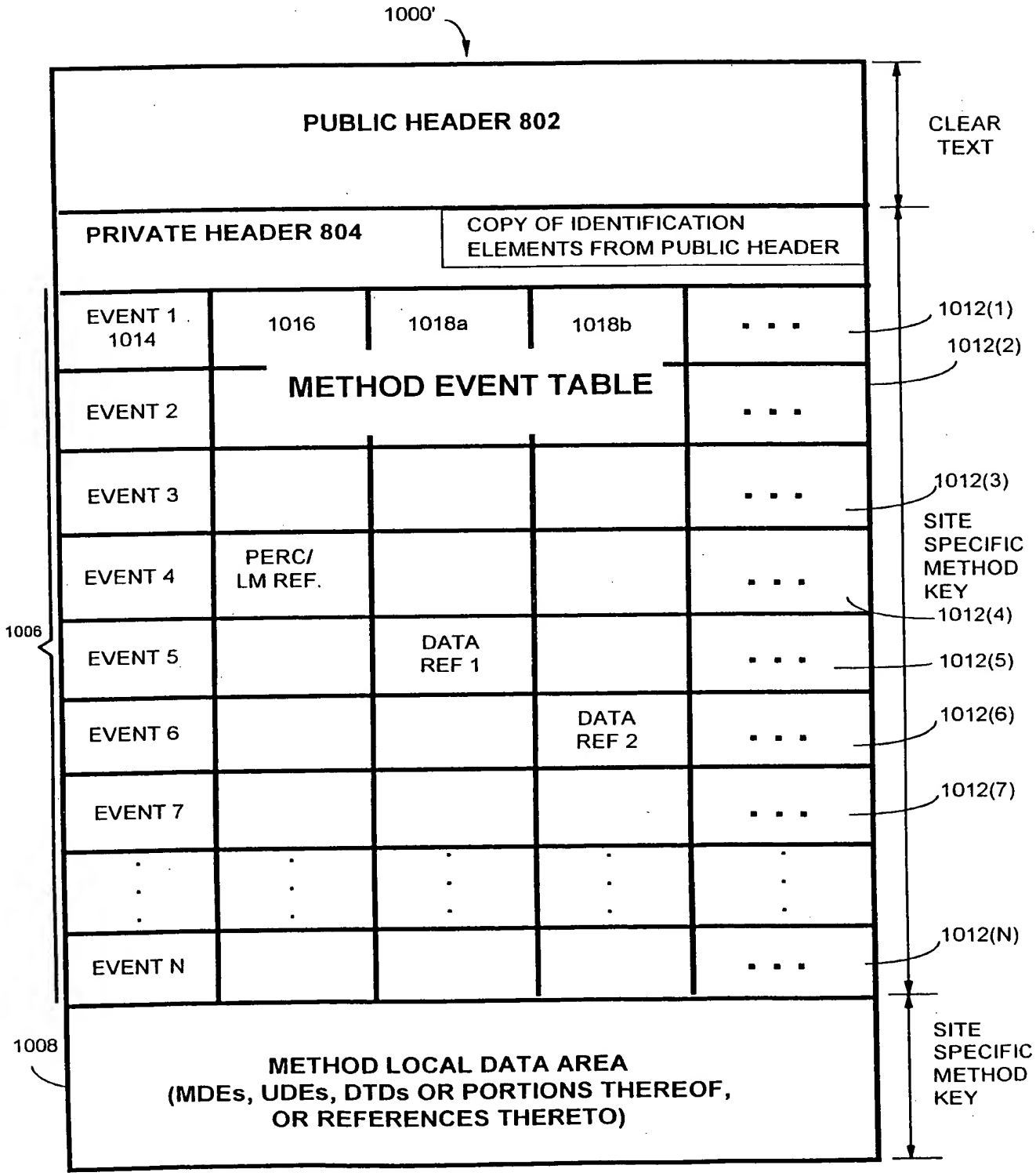

1000'
PUBLIC HEADER 802
CLEAR TEXT
PRIVATE HEADER 804
COPY OF IDENTIFICATION ELEMENTS FROM PUBLIC HEADER
EVENT 1 1014
1016
1018a
1018b
METHOD EVENT TABLE
EVENT 2
EVENT 3
EVENT 4
PERC/ LM REF.
EVENT 5
DATA REF 1
EVENT 6
DATA REF 2
EVENT 7
EVENT N
1012(1)
1012(2)
1012(3)
SITE SPECIFIC METHOD KEY
1012(4)
1012(5)
1012(6)
1012(7)
1012(N)
1006
1008
METHOD LOCAL DATA AREA
(MDEs, UDEs, DTDs OR PORTIONS THEREOF, OR REFERENCES THERETO)
SITE SPECIFIC METHOD KEY

FIG. 23

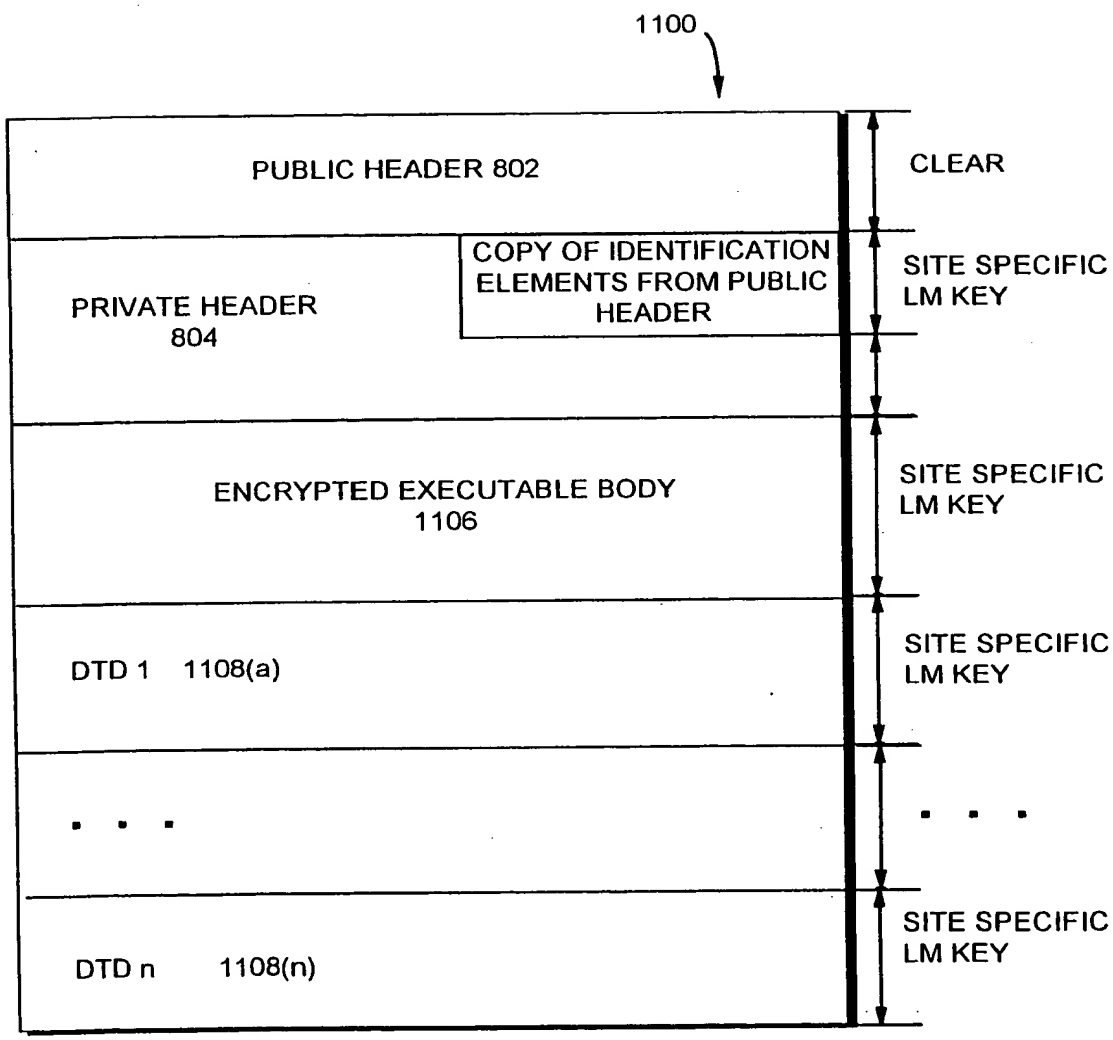

1100
PUBLIC HEADER 802
CLEAR
PRIVATE HEADER 804
COPY OF IDENTIFICATION ELEMENTS FROM PUBLIC HEADER
SITE SPECIFIC LM KEY
ENCRYPTED EXECUTABLE BODY 1106
SITE SPECIFIC LM KEY
DTD 1 1108(a)
SITE SPECIFIC LM KEY
. . .
. . .
DTD n 1108(n)
SITE SPECIFIC LM KEY

FIG. 24

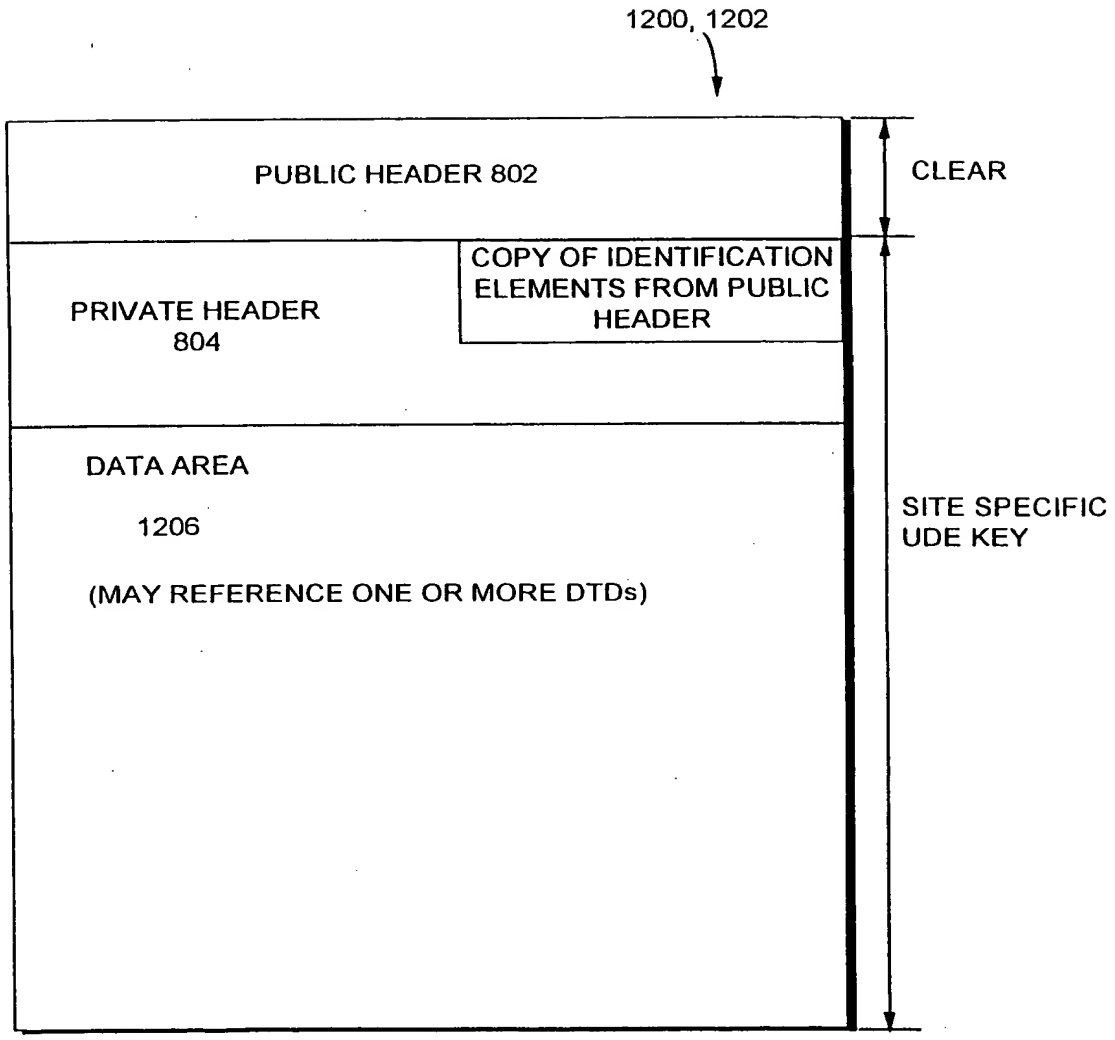

1200, 1202
PUBLIC HEADER 802
CLEAR
COPY OF IDENTIFICATION ELEMENTS FROM PUBLIC HEADER
PRIVATE HEADER 804
DATA AREA
1206
(MAY REFERENCE ONE OR MORE DTDs)
SITE SPECIFIC UDE KEY

FIG. 25A

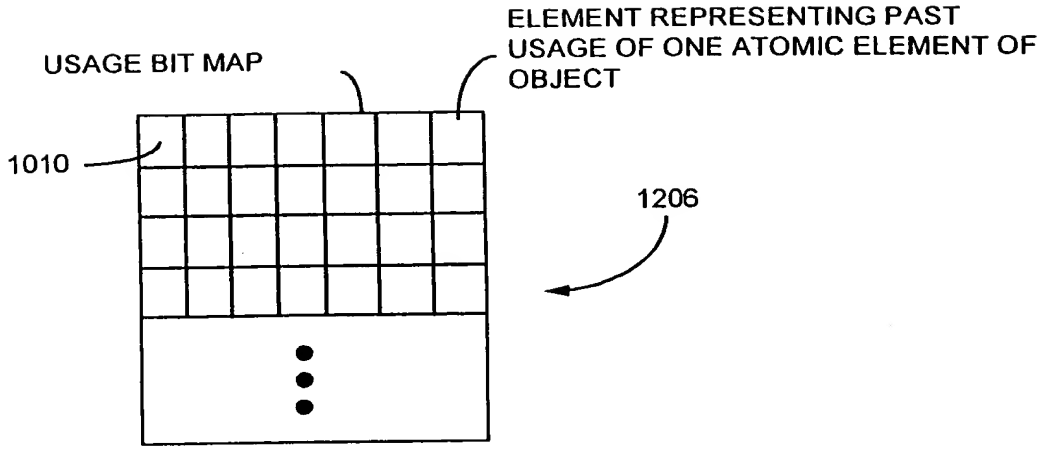


FIG. 25B

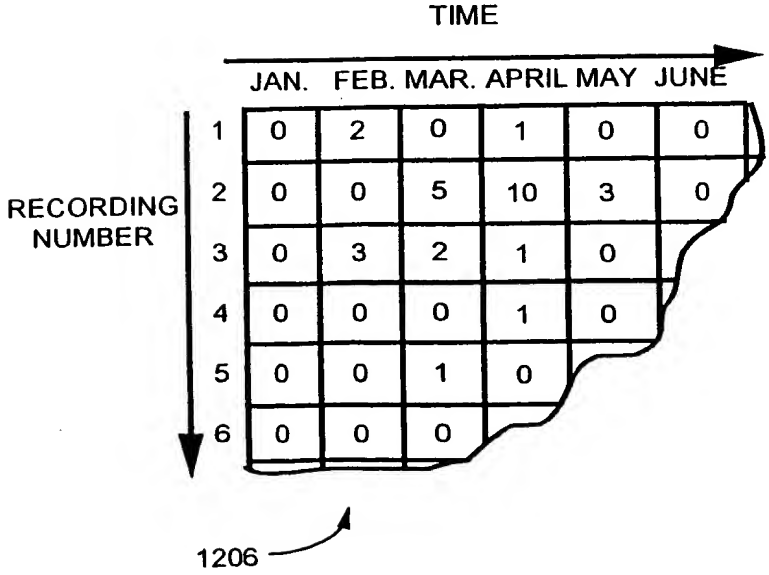


FIG. 25C

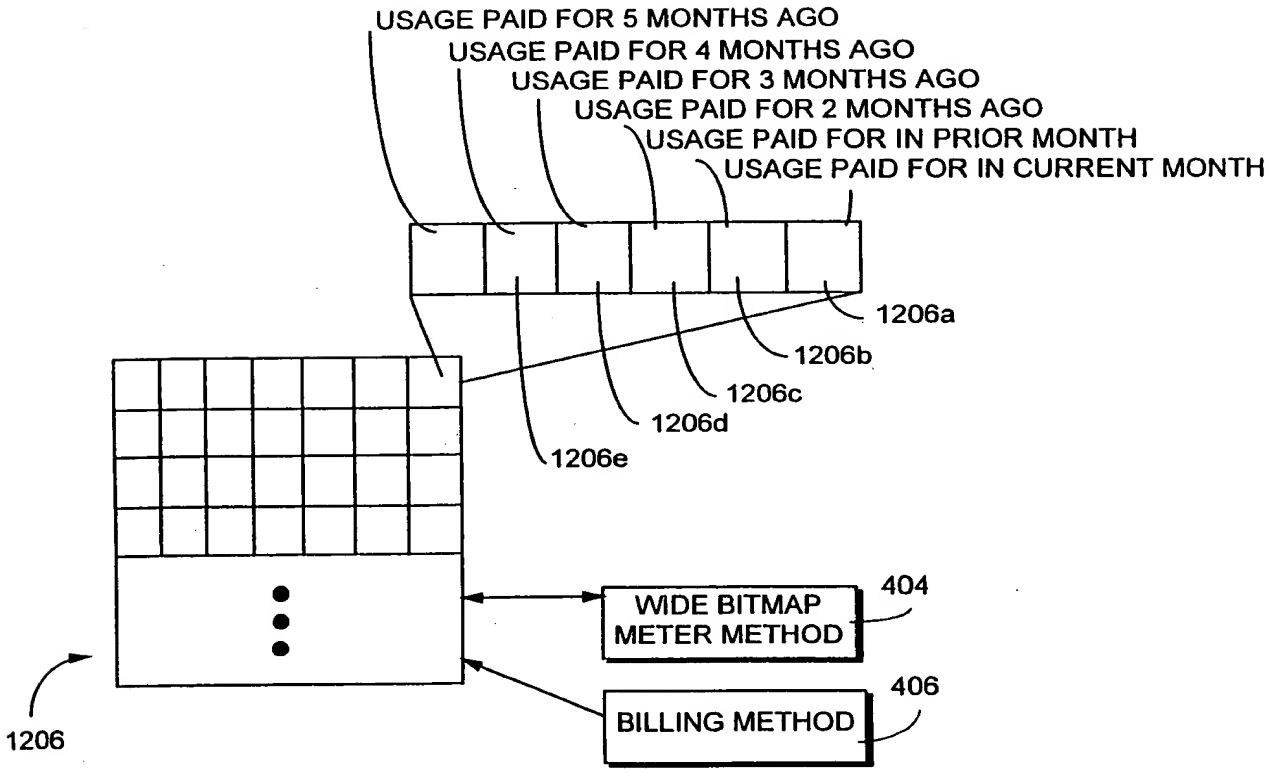

USAGE PAID FOR 5 MONTHS AGO
USAGE PAID FOR 4 MONTHS AGO
USAGE PAID FOR 3 MONTHS AGO
USAGE PAID FOR 2 MONTHS AGO
USAGE PAID FOR IN PRIOR MONTH
USAGE PAID FOR IN CURRENT MONTH
1206a
1206b
1206c
1206d
1206e
WIDE BITMAP METER METHOD
404
BILLING METHOD
406
1206

FIG. 26

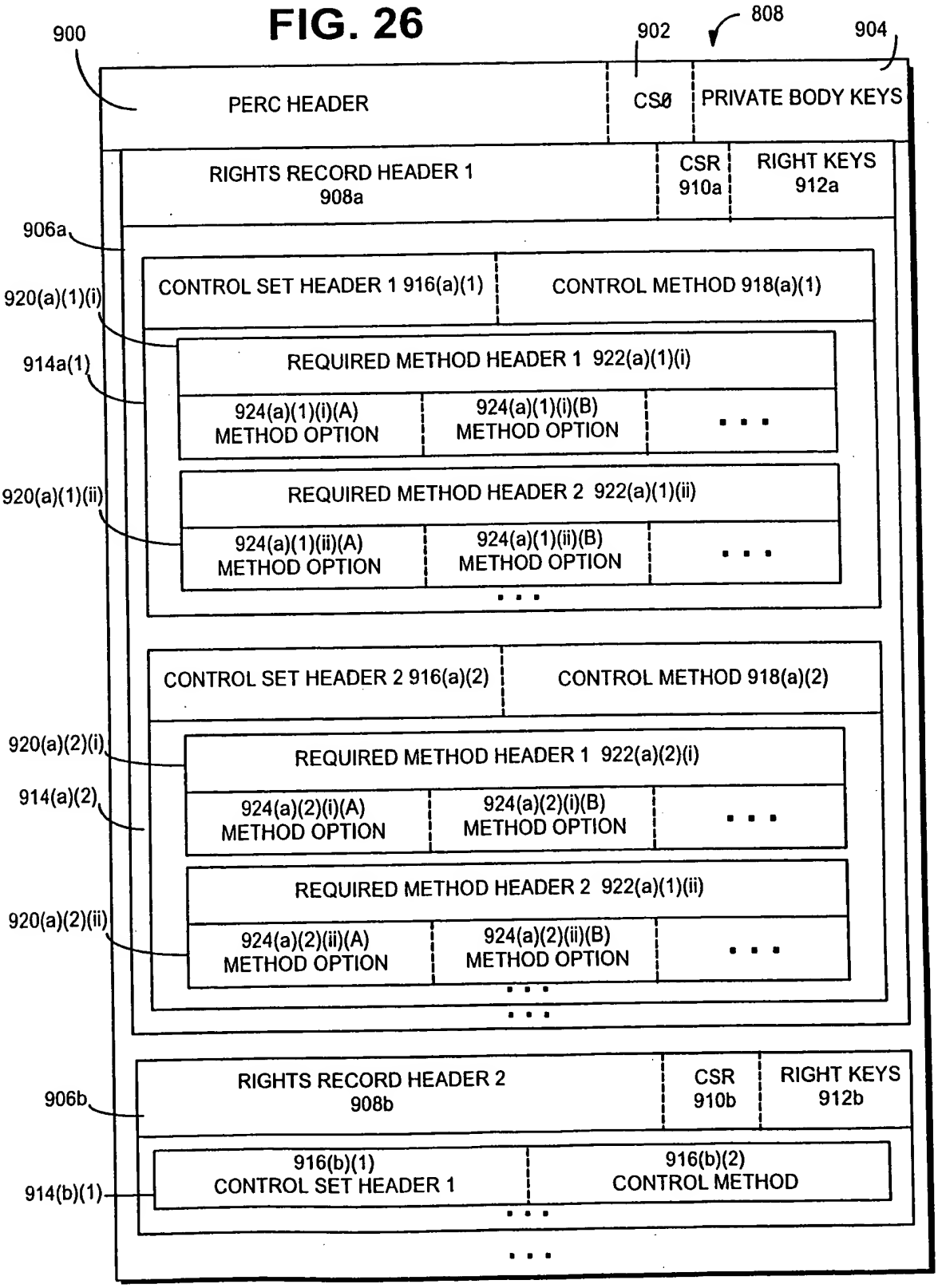

900
902
808
904
PERC HEADER
CSØ
PRIVATE BODY KEYS
RIGHTS RECORD HEADER 1
908a
CSR
910a
RIGHT KEYS
912a
906a
CONTROL SET HEADER 1 916(a)(1)
CONTROL METHOD 918(a)(1)
920(a)(1)(i)
REQUIRED METHOD HEADER 1 922(a)(1)(i)
914a(1)
924(a)(1)(i)(A)
METHOD OPTION
924(a)(1)(i)(B)
METHOD OPTION
920(a)(1)(ii)
REQUIRED METHOD HEADER 2 922(a)(1)(ii)
924(a)(1)(ii)(A)
METHOD OPTION
924(a)(1)(ii)(B)
METHOD OPTION
CONTROL SET HEADER 2 916(a)(2)
CONTROL METHOD 918(a)(2)
920(a)(2)(i)
REQUIRED METHOD HEADER 1 922(a)(2)(i)
914(a)(2)
924(a)(2)(i)(A)
METHOD OPTION
924(a)(2)(i)(B)
METHOD OPTION
REQUIRED METHOD HEADER 2 922(a)(1)(ii)
920(a)(2)(ii)
924(a)(2)(ii)(A)
METHOD OPTION
924(a)(2)(ii)(B)
METHOD OPTION
RIGHTS RECORD HEADER 2
908b
CSR
910b
RIGHT KEYS
912b
906b
916(b)(1)
CONTROL SET HEADER 1
916(b)(2)
CONTROL METHOD
914(b)(1)

FIG. 26A

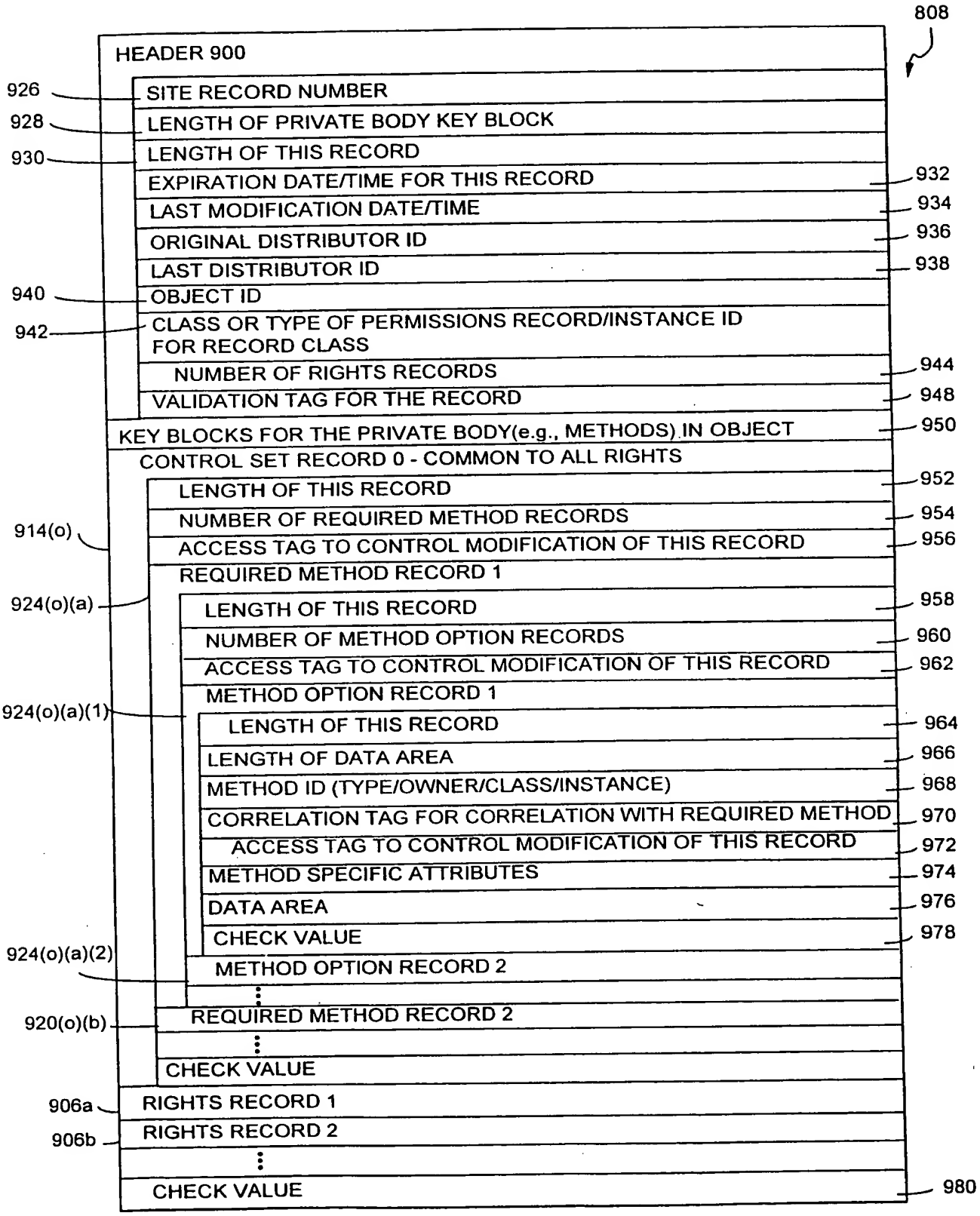

808
HEADER 900
926
SITE RECORD NUMBER
928
LENGTH OF PRIVATE BODY KEY BLOCK
930
LENGTH OF THIS RECORD
EXPIRATION DATE/TIME FOR THIS RECORD
932
LAST MODIFICATION DATE/TIME
934
ORIGINAL DISTRIBUTOR ID
936
LAST DISTRIBUTOR ID
938
940
OBJECT ID
942
CLASS OR TYPE OF PERMISSIONS RECORD/INSTANCE ID FOR RECORD CLASS
NUMBER OF RIGHTS RECORDS
944
VALIDATION TAG FOR THE RECORD
948
KEY BLOCKS FOR THE PRIVATE BODY(e.g., METHODS) IN OBJECT
950
CONTROL SET RECORD 0 - COMMON TO ALL RIGHTS
LENGTH OF THIS RECORD
952
NUMBER OF REQUIRED METHOD RECORDS
954
914(o)
ACCESS TAG TO CONTROL MODIFICATION OF THIS RECORD
956
REQUIRED METHOD RECORD 1
924(o)(a)
LENGTH OF THIS RECORD
958
NUMBER OF METHOD OPTION RECORDS
960
ACCESS TAG TO CONTROL MODIFICATION OF THIS RECORD
962
METHOD OPTION RECORD 1
924(o)(a)(1)
LENGTH OF THIS RECORD
964
LENGTH OF DATA AREA
966
METHOD ID (TYPE/OWNER/CLASS/INSTANCE)
968
CORRELATION TAG FOR CORRELATION WITH REQUIRED METHOD
970
ACCESS TAG TO CONTROL MODIFICATION OF THIS RECORD
972
METHOD SPECIFIC ATTRIBUTES
974
DATA AREA
976
CHECK VALUE
978
924(o)(a)(2)
METHOD OPTION RECORD 2
920(o)(b)
REQUIRED METHOD RECORD 2
CHECK VALUE
906a
RIGHTS RECORD 1
906b
RIGHTS RECORD 2
CHECK VALUE
980

FIG. 26B

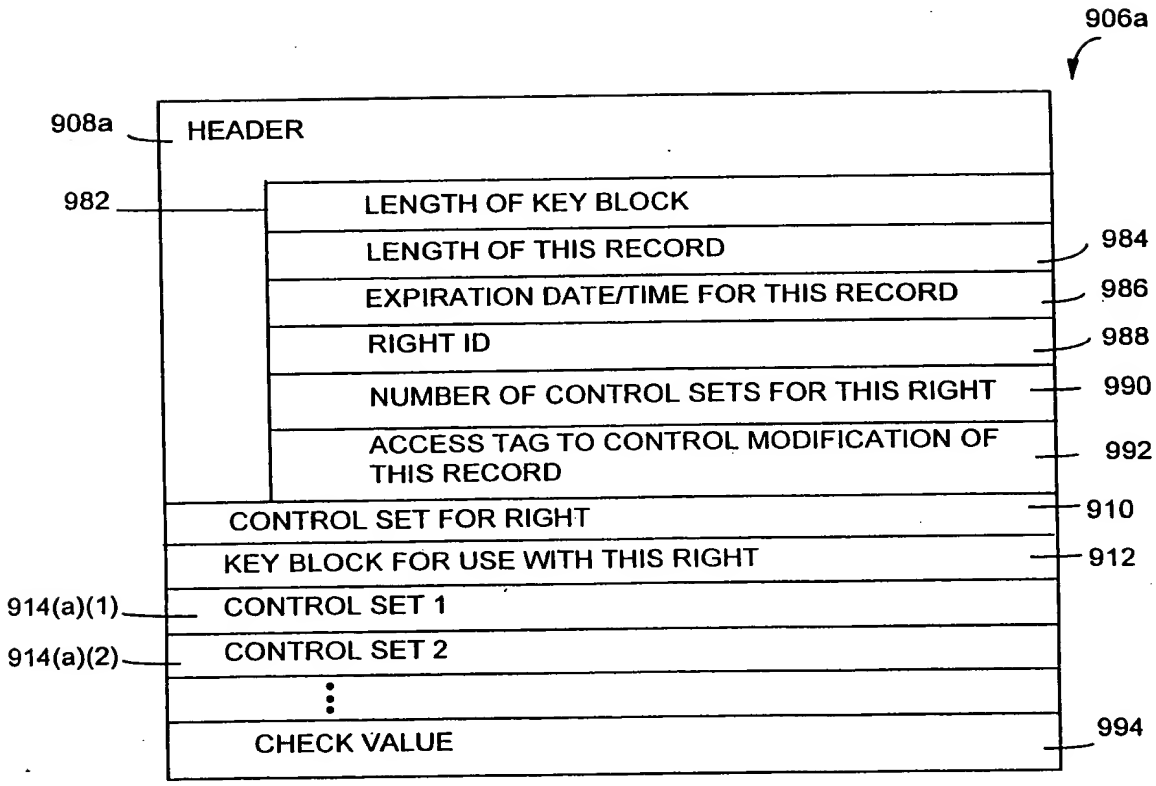

906a
908a
HEADER
982
LENGTH OF KEY BLOCK
LENGTH OF THIS RECORD
984
EXPIRATION DATE/TIME FOR THIS RECORD
986
RIGHT ID
988
NUMBER OF CONTROL SETS FOR THIS RIGHT
990
ACCESS TAG TO CONTROL MODIFICATION OF THIS RECORD
992
CONTROL SET FOR RIGHT
910
KEY BLOCK FOR USE WITH THIS RIGHT
912
914(a)(1)
CONTROL SET 1
914(a)(2)
CONTROL SET 2
CHECK VALUE
994

FIG. 27

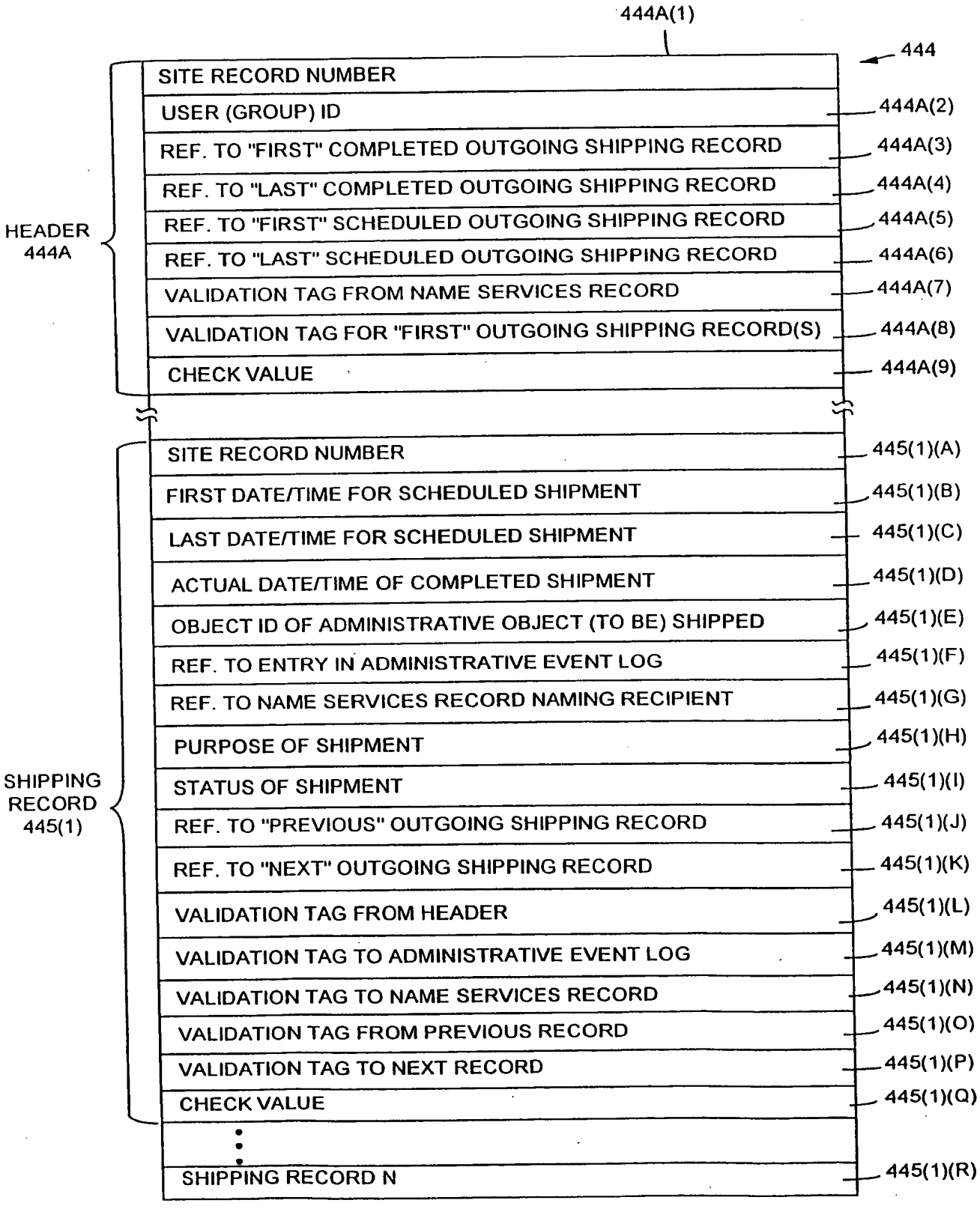

444A(1)
444
SITE RECORD NUMBER
USER (GROUP) ID
444A(2)
REF. TO "FIRST" COMPLETED OUTGOING SHIPPING RECORD
444A(3)
REF. TO "LAST" COMPLETED OUTGOING SHIPPING RECORD
444A(4)
REF. TO "FIRST" SCHEDULED OUTGOING SHIPPING RECORD
444A(5)
REF. TO "LAST" SCHEDULED OUTGOING SHIPPING RECORD
444A(6)
VALIDATION TAG FROM NAME SERVICES RECORD
444A(7)
VALIDATION TAG FOR "FIRST" OUTGOING SHIPPING RECORD(S)
444A(8)
CHECK VALUE
444A(9)
HEADER
444A
SITE RECORD NUMBER
445(1)(A)
FIRST DATE/TIME FOR SCHEDULED SHIPMENT
445(1)(B)
LAST DATE/TIME FOR SCHEDULED SHIPMENT
445(1)(C)
ACTUAL DATE/TIME OF COMPLETED SHIPMENT
445(1)(D)
OBJECT ID OF ADMINISTRATIVE OBJECT (TO BE) SHIPPED
445(1)(E)
REF. TO ENTRY IN ADMINISTRATIVE EVENT LOG
445(1)(F)
REF. TO NAME SERVICES RECORD NAMING RECIPIENT
445(1)(G)
PURPOSE OF SHIPMENT
445(1)(H)
STATUS OF SHIPMENT
445(1)(I)
REF. TO "PREVIOUS" OUTGOING SHIPPING RECORD
445(1)(J)
REF. TO "NEXT" OUTGOING SHIPPING RECORD
445(1)(K)
VALIDATION TAG FROM HEADER
445(1)(L)
VALIDATION TAG TO ADMINISTRATIVE EVENT LOG
445(1)(M)
VALIDATION TAG TO NAME SERVICES RECORD
445(1)(N)
VALIDATION TAG FROM PREVIOUS RECORD
445(1)(O)
VALIDATION TAG TO NEXT RECORD
445(1)(P)
CHECK VALUE
445(1)(Q)
SHIPPING RECORD N
445(1)(R)
SHIPPING
RECORD
445(1)

FIG. 28

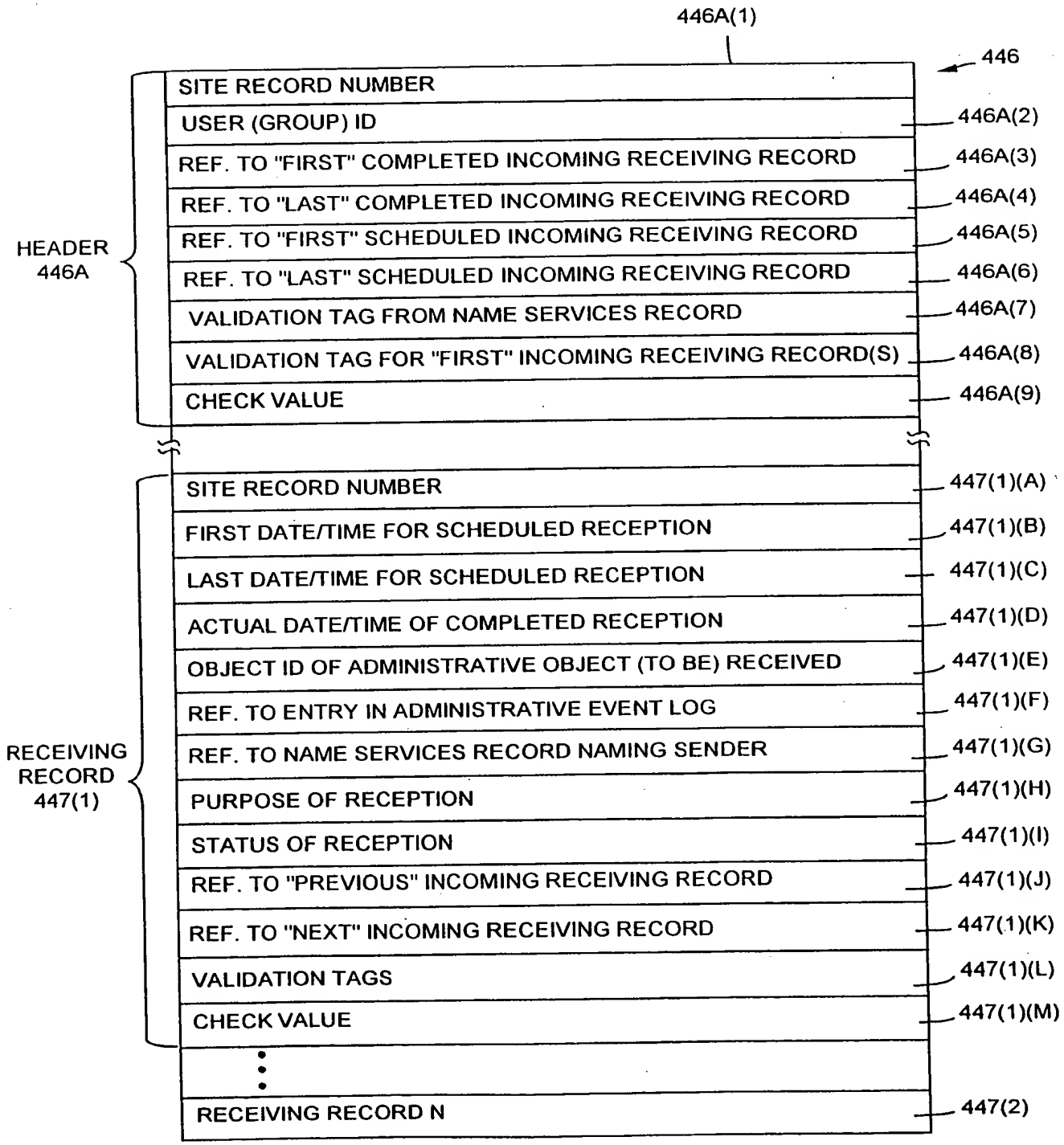

446A(1)
446
SITE RECORD NUMBER
USER (GROUP) ID
446A(2)
REF. TO "FIRST" COMPLETED INCOMING RECEIVING RECORD
446A(3)
REF. TO "LAST" COMPLETED INCOMING RECEIVING RECORD
446A(4)
REF. TO "FIRST" SCHEDULED INCOMING RECEIVING RECORD
446A(5)
REF. TO "LAST" SCHEDULED INCOMING RECEIVING RECORD
446A(6)
VALIDATION TAG FROM NAME SERVICES RECORD
446A(7)
VALIDATION TAG FOR "FIRST" INCOMING RECEIVING RECORD(S)
446A(8)
CHECK VALUE
446A(9)
HEADER
446A
SITE RECORD NUMBER
447(1)(A)
FIRST DATE/TIME FOR SCHEDULED RECEPTION
447(1)(B)
LAST DATE/TIME FOR SCHEDULED RECEPTION
447(1)(C)
ACTUAL DATE/TIME OF COMPLETED RECEPTION
447(1)(D)
OBJECT ID OF ADMINISTRATIVE OBJECT (TO BE) RECEIVED
447(1)(E)
REF. TO ENTRY IN ADMINISTRATIVE EVENT LOG
447(1)(F)
REF. TO NAME SERVICES RECORD NAMING SENDER
447(1)(G)
PURPOSE OF RECEPTION
447(1)(H)
STATUS OF RECEPTION
447(1)(I)
REF. TO "PREVIOUS" INCOMING RECEIVING RECORD
447(1)(J)
REF. TO "NEXT" INCOMING RECEIVING RECORD
447(1)(K)
VALIDATION TAGS
447(1)(L)
CHECK VALUE
447(1)(M)
RECEIVING
RECORD
447(1)
RECEIVING RECORD N
447(2)

FIG. 29

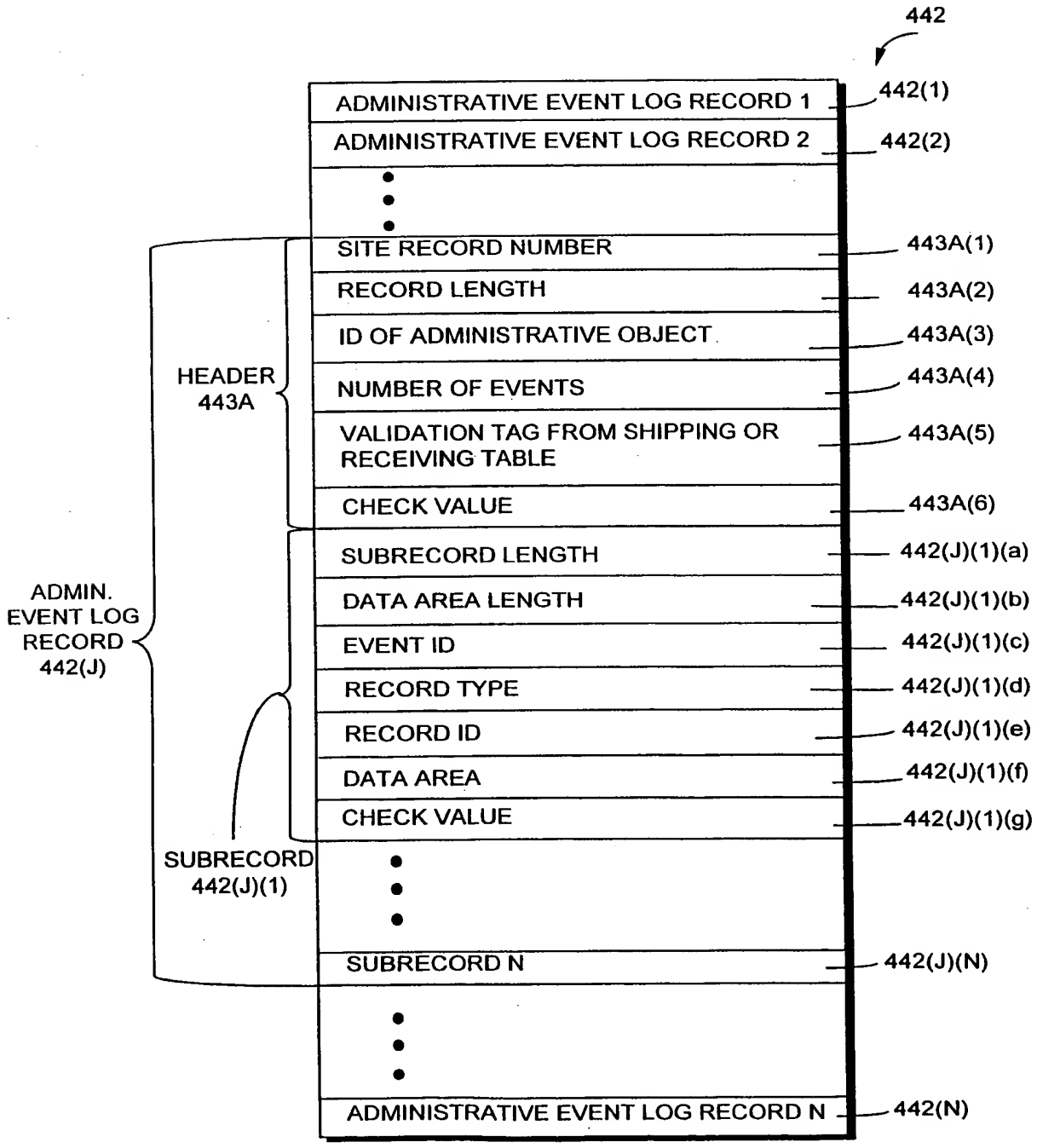
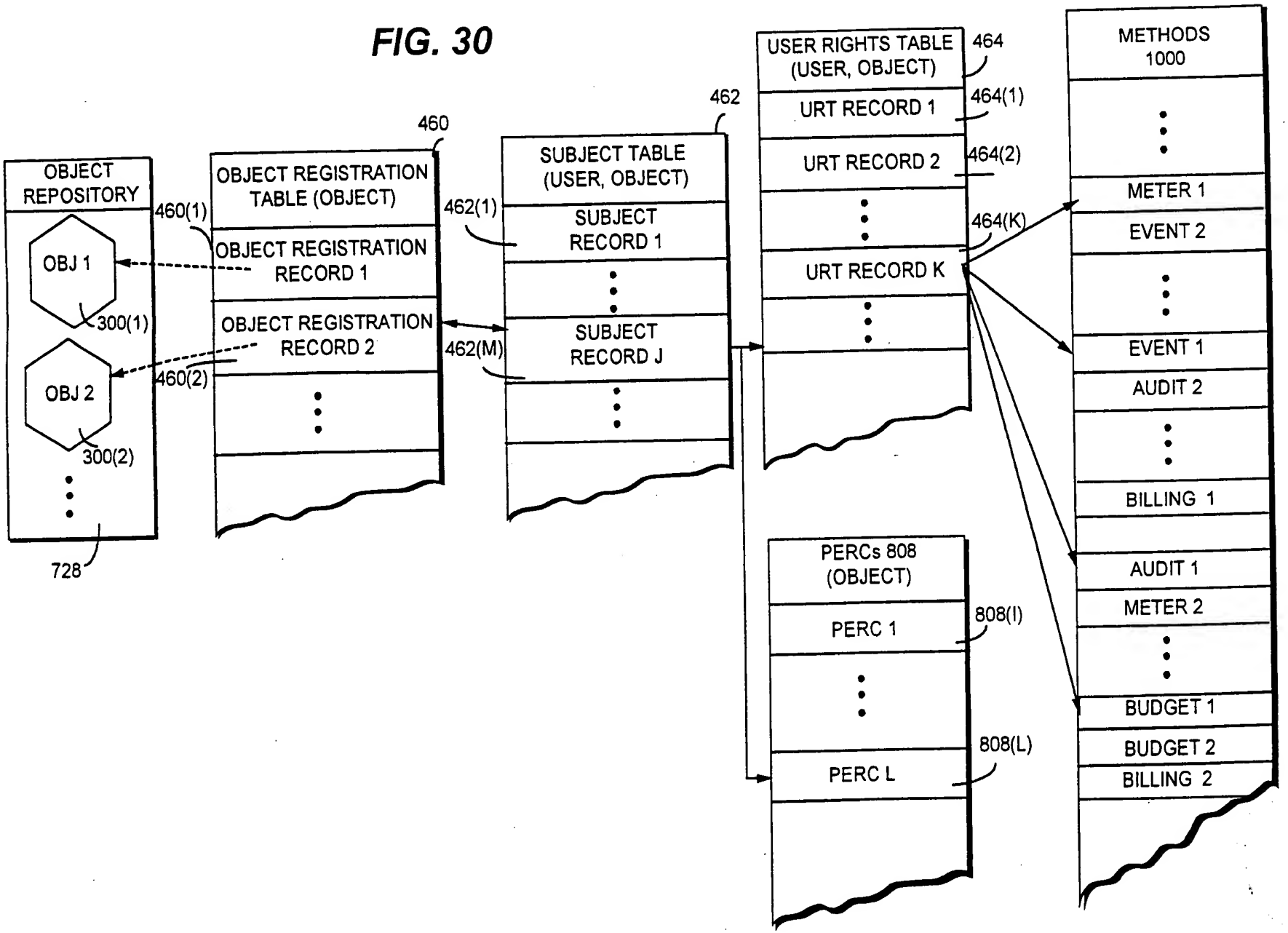

442
ADMINISTRATIVE EVENT LOG RECORD 1
442(1)
ADMINISTRATIVE EVENT LOG RECORD 2
442(2)
SITE RECORD NUMBER
443A(1)
RECORD LENGTH
443A(2)
ID OF ADMINISTRATIVE OBJECT
443A(3)
NUMBER OF EVENTS
443A(4)
VALIDATION TAG FROM SHIPPING OR RECEIVING TABLE
443A(5)
CHECK VALUE
443A(6)
HEADER 443A
SUBRECORD LENGTH
442(J)(1)(a)
DATA AREA LENGTH
442(J)(1)(b)
EVENT ID
442(J)(1)(c)
RECORD TYPE
442(J)(1)(d)
RECORD ID
442(J)(1)(e)
DATA AREA
442(J)(1)(f)
CHECK VALUE
442(J)(1)(g)
ADMIN. EVENT LOG RECORD 442(J)
SUBRECORD 442(J)(1)
SUBRECORD N
442(J)(N)
ADMINISTRATIVE EVENT LOG RECORD N
442(N)

FIG. 30


OBJECT REPOSITORY
OBJ 1
300(1)
OBJ 2
300(2)
728
460
OBJECT REGISTRATION TABLE (OBJECT)
460(1)
OBJECT REGISTRATION RECORD 1
OBJECT REGISTRATION RECORD 2
460(2)
462
SUBJECT TABLE (USER, OBJECT)
462(1)
SUBJECT RECORD 1
462(M)
SUBJECT RECORD J
USER RIGHTS TABLE (USER, OBJECT)
464
URT RECORD 1
464(1)
URT RECORD 2
464(2)
464(K)
URT RECORD K
PERCs 808 (OBJECT)
PERC 1
808(I)
808(L)
PERC L
METHODS 1000
METER 1
EVENT 2
EVENT 1
AUDIT 2
BILLING 1
AUDIT 1
METER 2
BUDGET 1
BUDGET 2
BILLING 2

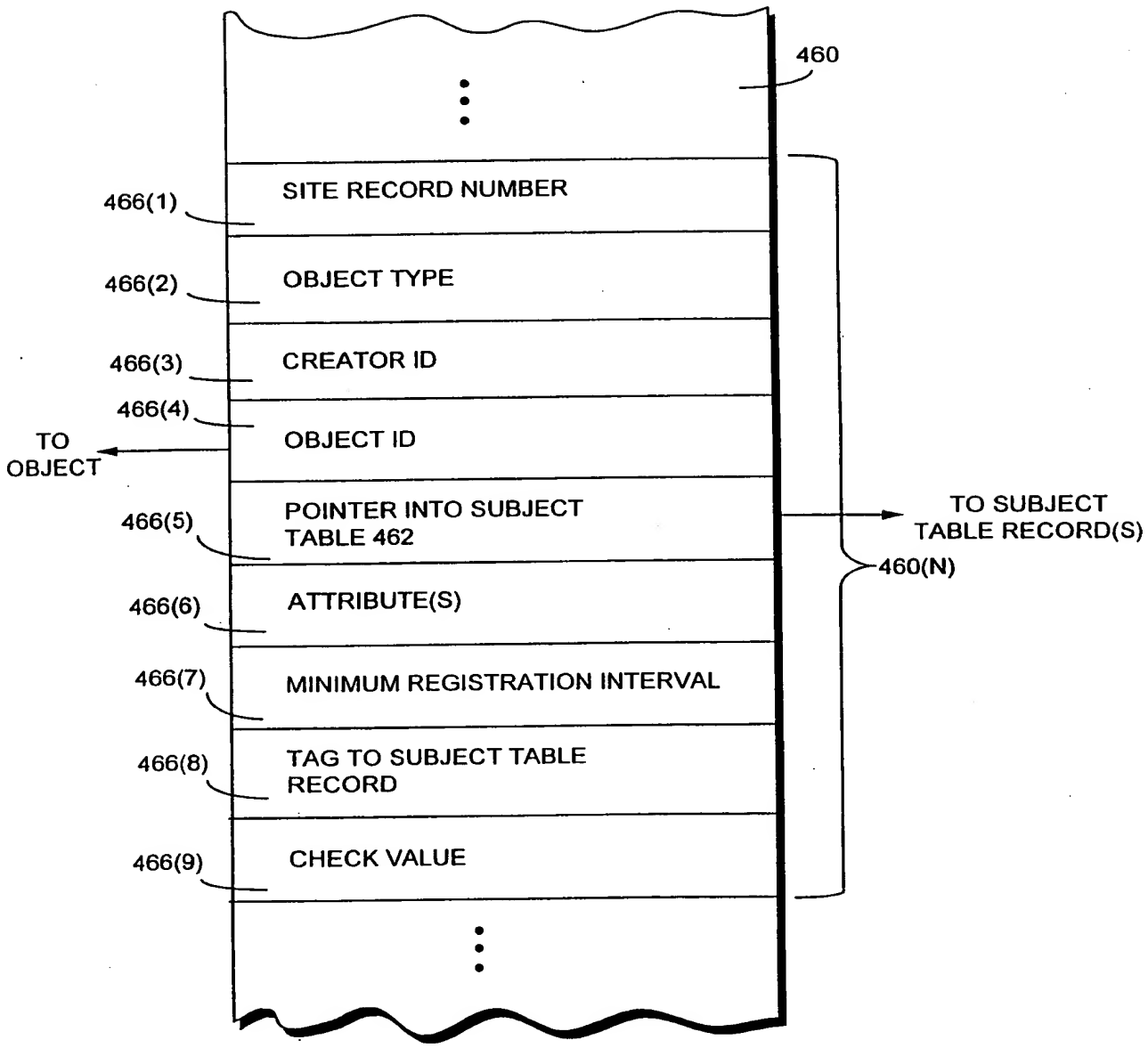

460
466(1)
SITE RECORD NUMBER
466(2)
OBJECT TYPE
466(3)
CREATOR ID
466(4)
OBJECT ID
TO OBJECT
466(5)
POINTER INTO SUBJECT TABLE 462
TO SUBJECT TABLE RECORD(S)
460(N)
466(6)
ATTRIBUTE(S)
466(7)
MINIMUM REGISTRATION INTERVAL
466(8)
TAG TO SUBJECT TABLE RECORD
466(9)
CHECK VALUE

FIG. 31

FIG. 32

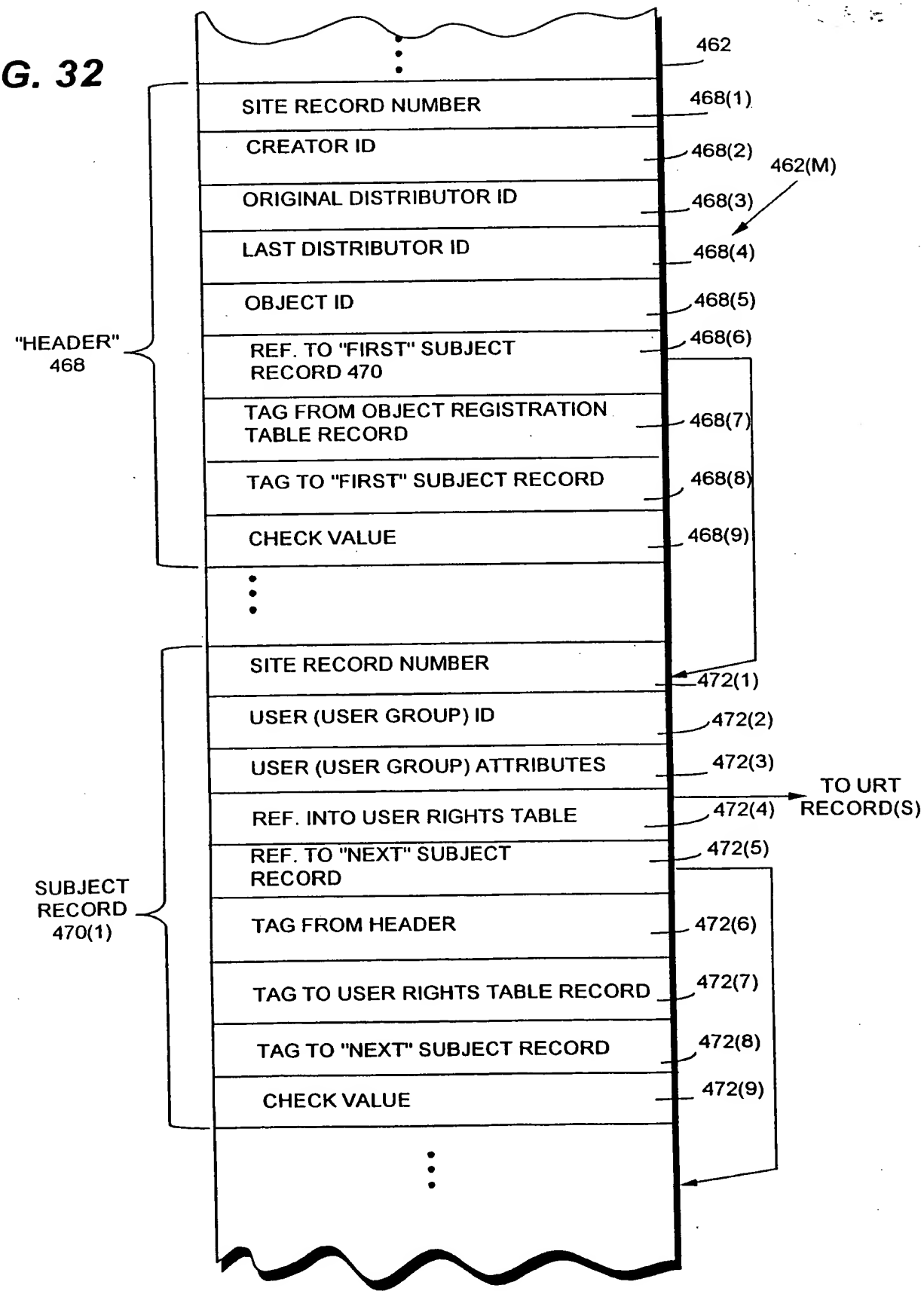

462
SITE RECORD NUMBER
468(1)
CREATOR ID
468(2)
462(M)
ORIGINAL DISTRIBUTOR ID
468(3)
LAST DISTRIBUTOR ID
468(4)
OBJECT ID
468(5)
"HEADER" 468
REF. TO "FIRST" SUBJECT RECORD 470
468(6)
TAG FROM OBJECT REGISTRATION TABLE RECORD
468(7)
TAG TO "FIRST" SUBJECT RECORD
468(8)
CHECK VALUE
468(9)
SITE RECORD NUMBER
472(1)
USER (USER GROUP) ID
472(2)
USER (USER GROUP) ATTRIBUTES
472(3)
TO URT RECORD(S)
REF. INTO USER RIGHTS TABLE
472(4)
REF. TO "NEXT" SUBJECT RECORD
472(5)
SUBJECT RECORD 470(1)
TAG FROM HEADER
472(6)
TAG TO USER RIGHTS TABLE RECORD
472(7)
TAG TO "NEXT" SUBJECT RECORD
472(8)
CHECK VALUE
472(9)

FIG. 33

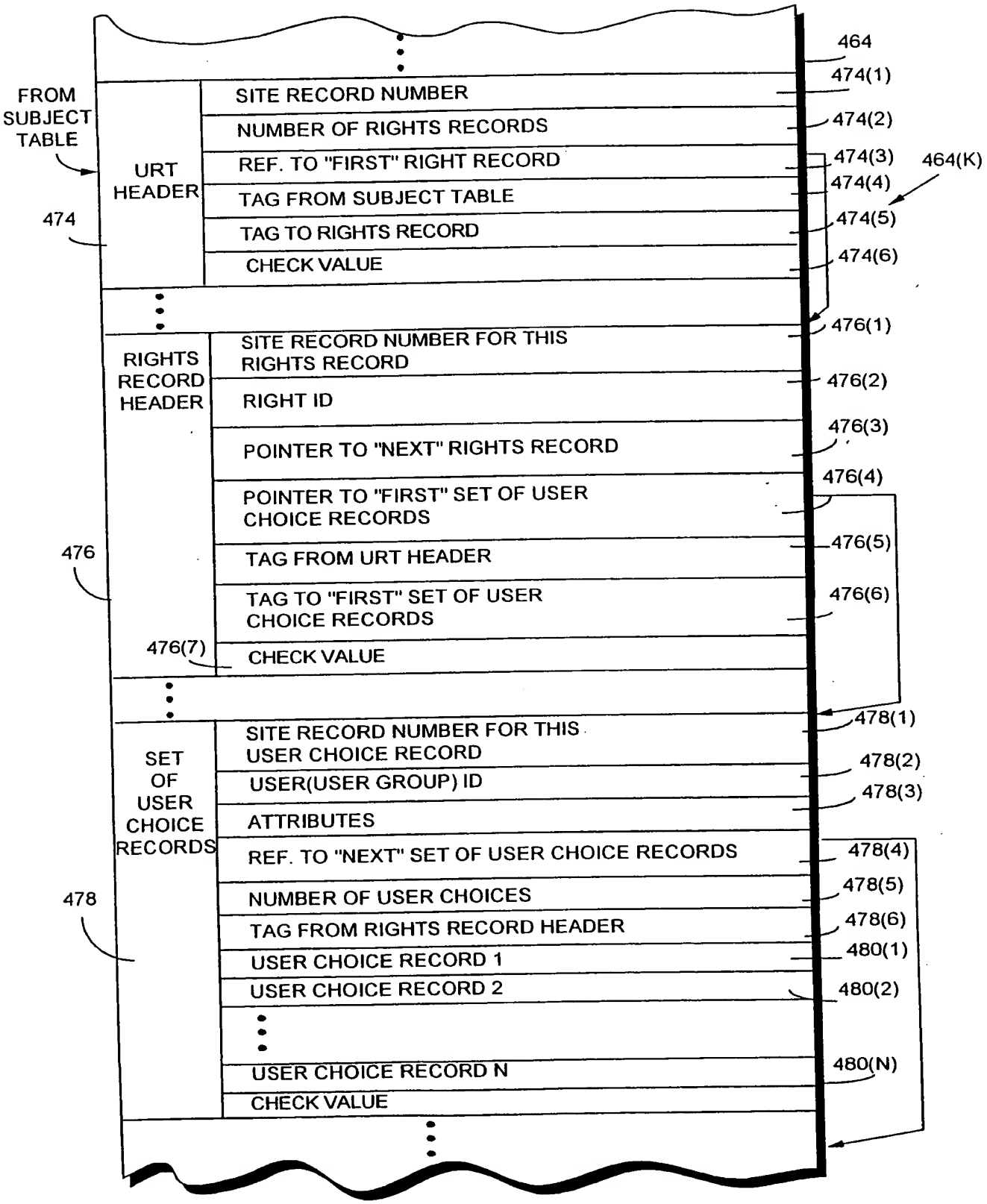

464
FROM SUBJECT TABLE
URT HEADER
474
SITE RECORD NUMBER
NUMBER OF RIGHTS RECORDS
REF. TO "FIRST" RIGHT RECORD
TAG FROM SUBJECT TABLE
TAG TO RIGHTS RECORD
CHECK VALUE
474(1)
474(2)
474(3)
474(4)
474(5)
474(6)
464(K)
RIGHTS RECORD HEADER
476
SITE RECORD NUMBER FOR THIS RIGHTS RECORD
RIGHT ID
POINTER TO "NEXT" RIGHTS RECORD
POINTER TO "FIRST" SET OF USER CHOICE RECORDS
TAG FROM URT HEADER
TAG TO "FIRST" SET OF USER CHOICE RECORDS
CHECK VALUE
476(1)
476(2)
476(3)
476(4)
476(5)
476(6)
476(7)
SET OF USER CHOICE RECORDS
478
SITE RECORD NUMBER FOR THIS USER CHOICE RECORD
USER(USER GROUP) ID
ATTRIBUTES
REF. TO "NEXT" SET OF USER CHOICE RECORDS
NUMBER OF USER CHOICES
TAG FROM RIGHTS RECORD HEADER
USER CHOICE RECORD 1
USER CHOICE RECORD 2
USER CHOICE RECORD N
CHECK VALUE
478(1)
478(2)
478(3)
478(4)
478(5)
478(6)
480(1)
480(2)
480(N)

FIG. 34

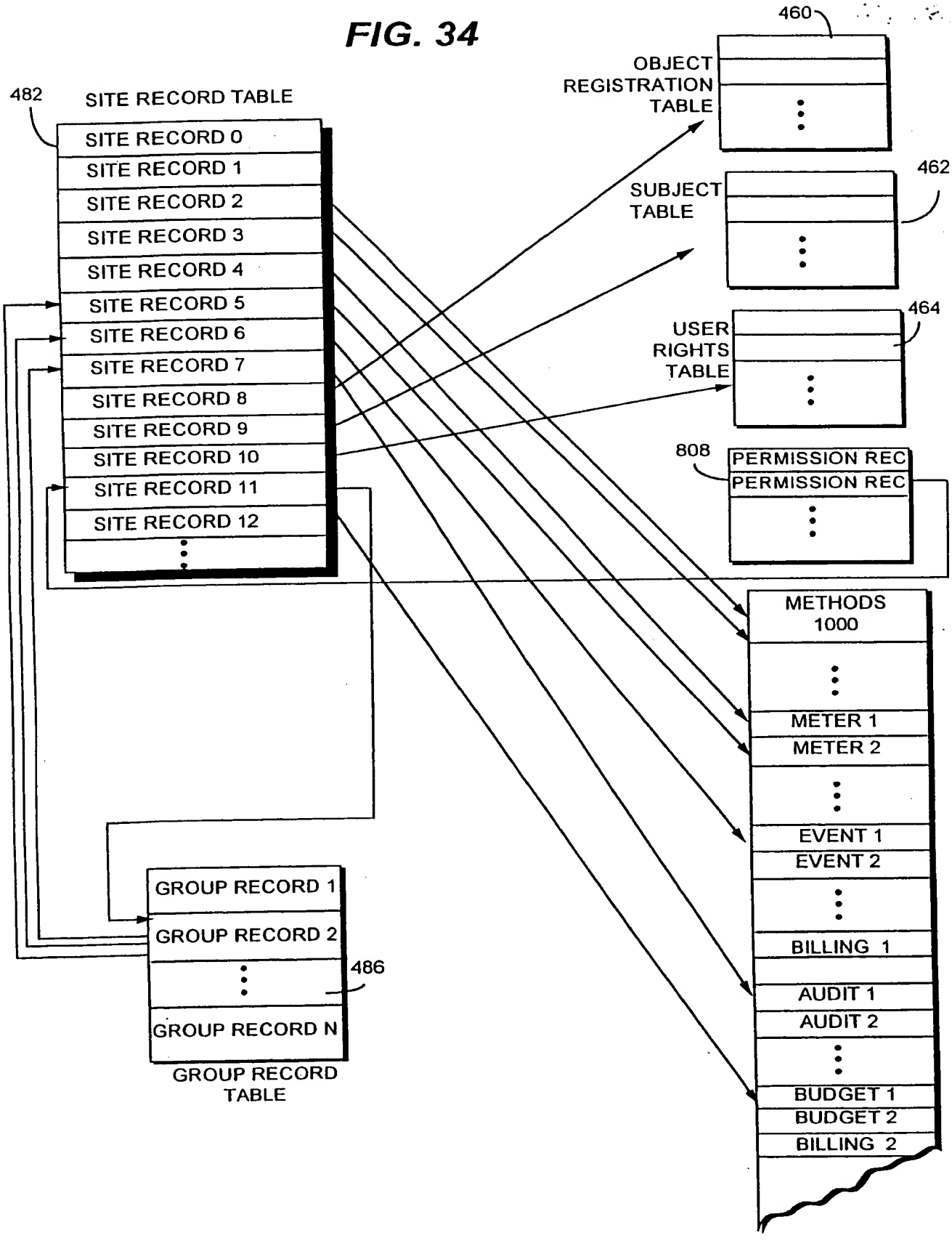

482
SITE RECORD TABLE
SITE RECORD 0
SITE RECORD 1
SITE RECORD 2
SITE RECORD 3
SITE RECORD 4
SITE RECORD 5
SITE RECORD 6
SITE RECORD 7
SITE RECORD 8
SITE RECORD 9
SITE RECORD 10
SITE RECORD 11
SITE RECORD 12
460
OBJECT REGISTRATION TABLE
462
SUBJECT TABLE
464
USER RIGHTS TABLE
808
PERMISSION REC
PERMISSION REC
METHODS 1000
METER 1
METER 2
EVENT 1
EVENT 2
BILLING 1
AUDIT 1
AUDIT 2
BUDGET 1
BUDGET 2
BILLING 2
GROUP RECORD 1
GROUP RECORD 2
GROUP RECORD N
486
GROUP RECORD TABLE

FIG. 34A

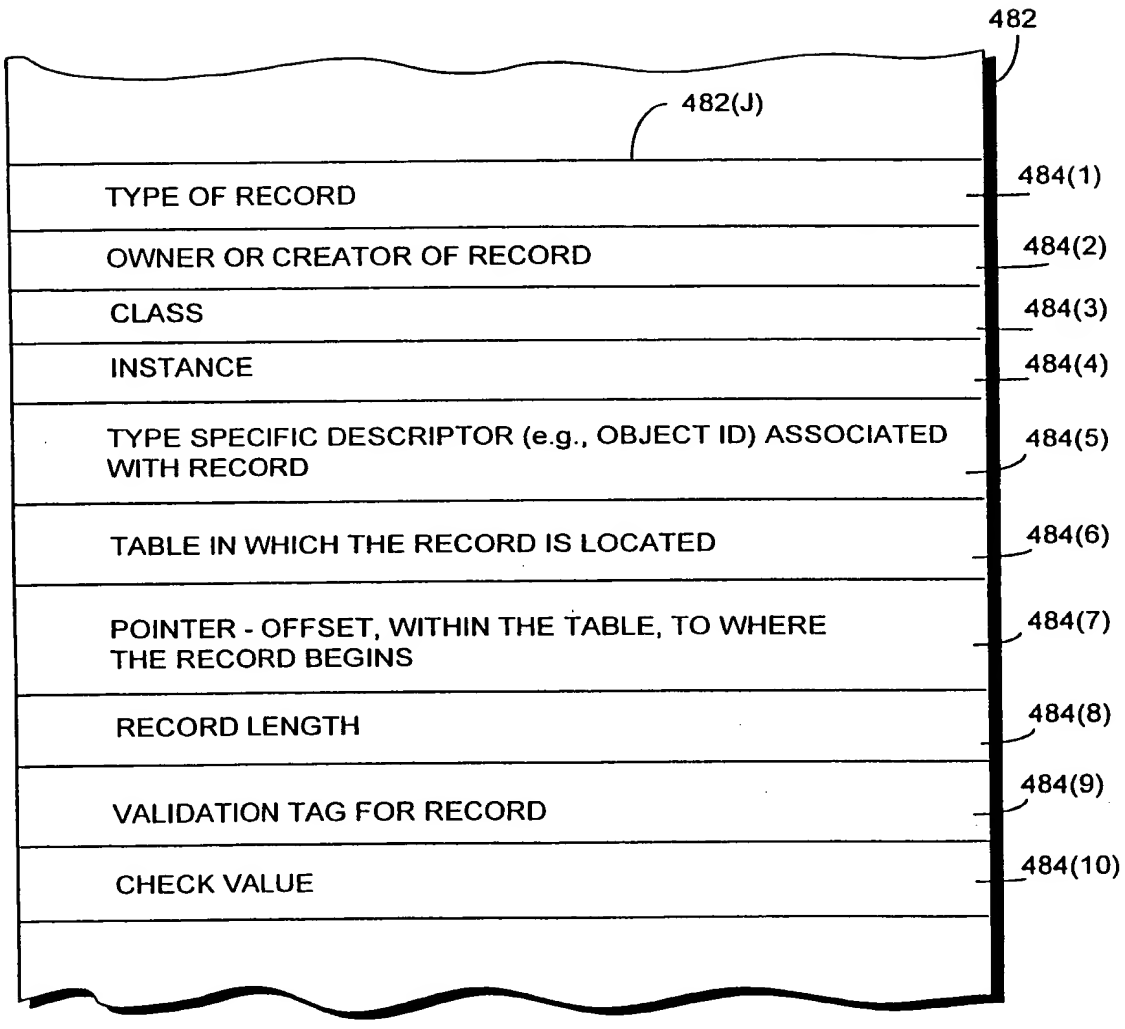

482
482(J)
TYPE OF RECORD
484(1)
OWNER OR CREATOR OF RECORD
484(2)
CLASS
484(3)
INSTANCE
484(4)
TYPE SPECIFIC DESCRIPTOR (e.g., OBJECT ID) ASSOCIATED WITH RECORD
484(5)
TABLE IN WHICH THE RECORD IS LOCATED
484(6)
POINTER - OFFSET, WITHIN THE TABLE, TO WHERE THE RECORD BEGINS
484(7)
RECORD LENGTH
484(8)
VALIDATION TAG FOR RECORD
484(9)
CHECK VALUE
484(10)

FIG. 34B

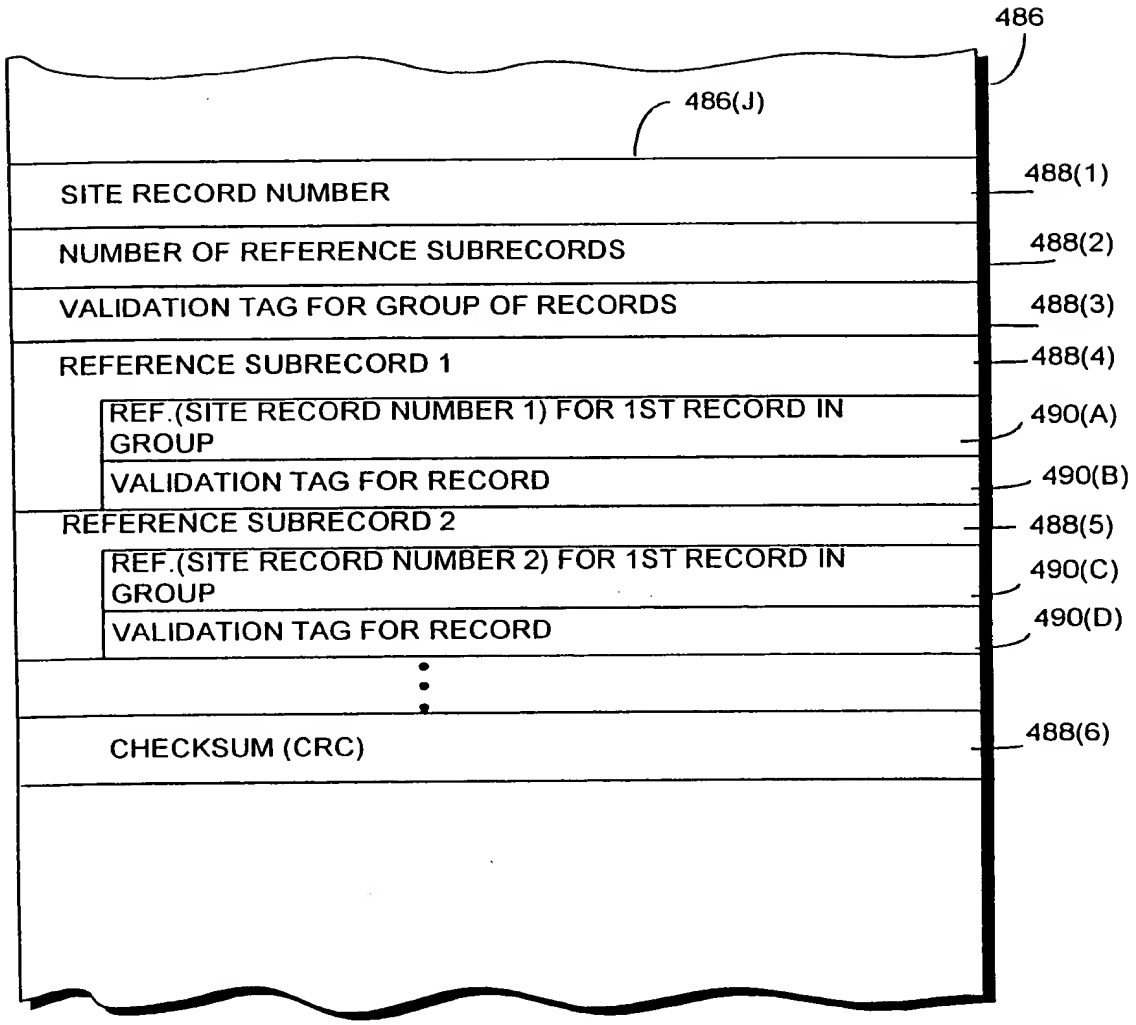

486
486(J)
SITE RECORD NUMBER
488(1)
NUMBER OF REFERENCE SUBRECORDS
488(2)
VALIDATION TAG FOR GROUP OF RECORDS
488(3)
REFERENCE SUBRECORD 1
488(4)
REF.(SITE RECORD NUMBER 1) FOR 1ST RECORD IN GROUP
490(A)
VALIDATION TAG FOR RECORD
490(B)
REFERENCE SUBRECORD 2
488(5)
REF.(SITE RECORD NUMBER 2) FOR 1ST RECORD IN GROUP
490(C)
VALIDATION TAG FOR RECORD
490(D)
CHECKSUM (CRC)
488(6)

FIG. 35

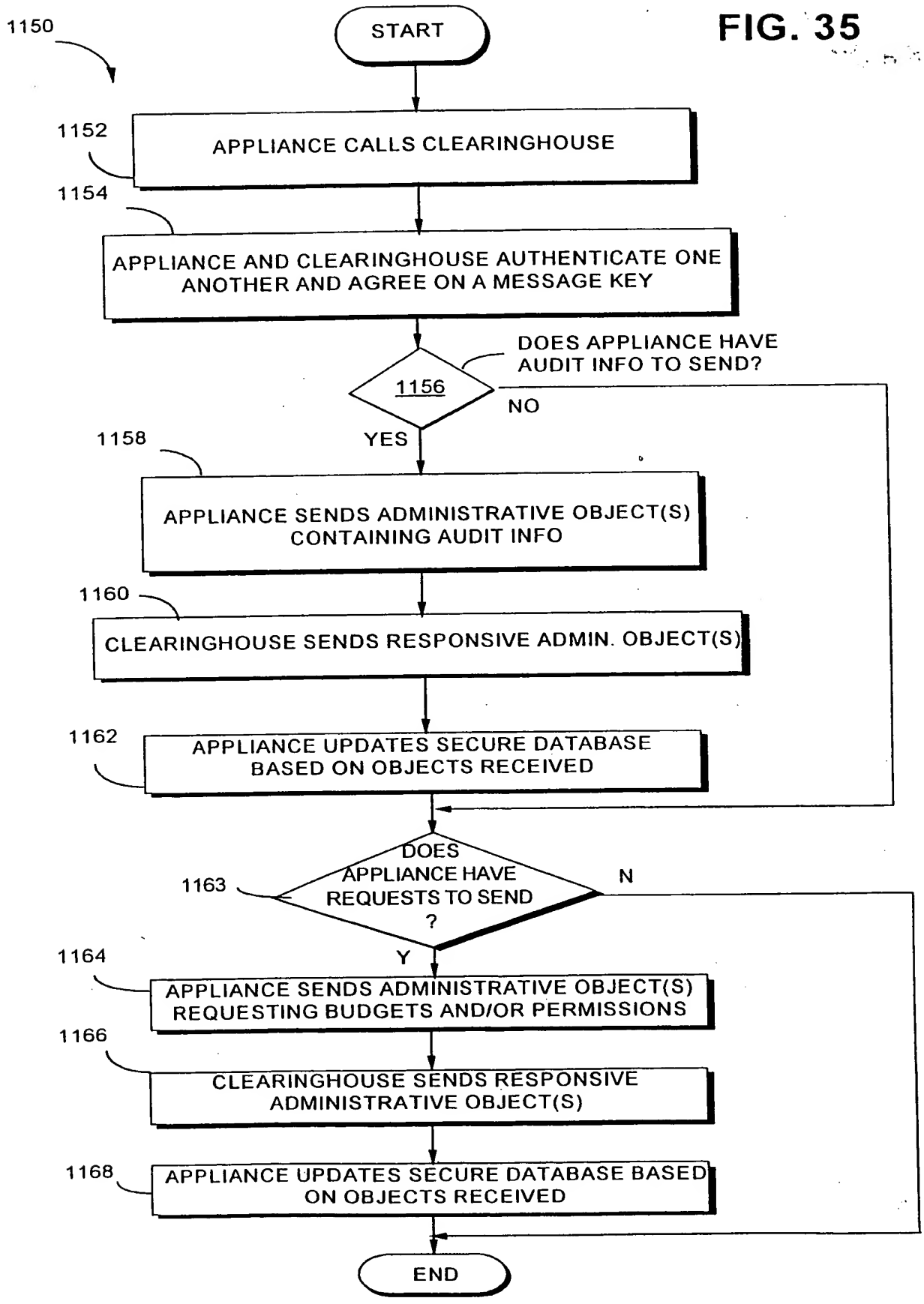

1150
START
1152
APPLIANCE CALLS CLEARINGHOUSE
1154
APPLIANCE AND CLEARINGHOUSE AUTHENTICATE ONE ANOTHER AND AGREE ON A MESSAGE KEY
DOES APPLIANCE HAVE AUDIT INFO TO SEND?
1156
NO
YES
1158
APPLIANCE SENDS ADMINISTRATIVE OBJECT(S) CONTAINING AUDIT INFO
1160
CLEARINGHOUSE SENDS RESPONSIVE ADMIN. OBJECT(S)
1162
APPLIANCE UPDATES SECURE DATABASE BASED ON OBJECTS RECEIVED
1163
DOES APPLIANCE HAVE REQUESTS TO SEND ?
N
Y
1164
APPLIANCE SENDS ADMINISTRATIVE OBJECT(S) REQUESTING BUDGETS AND/OR PERMISSIONS
1166
CLEARINGHOUSE SENDS RESPONSIVE ADMINISTRATIVE OBJECT(S)
1168
APPLIANCE UPDATES SECURE DATABASE BASED ON OBJECTS RECEIVED
END

FIG. 36

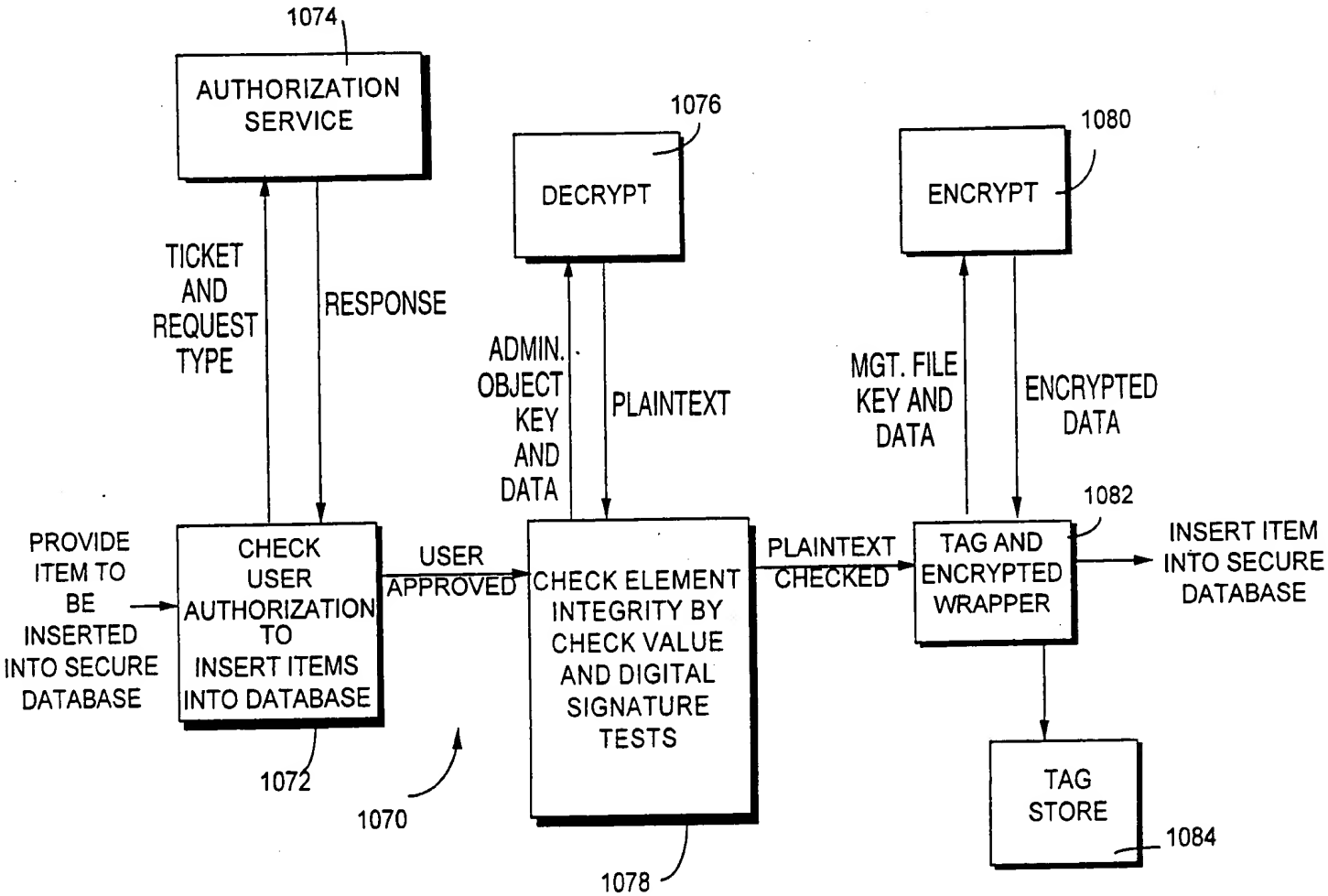

1074
AUTHORIZATION SERVICE
TICKET AND REQUEST TYPE
RESPONSE
PROVIDE ITEM TO BE INSERTED INTO SECURE DATABASE
CHECK USER AUTHORIZATION TO INSERT ITEMS INTO DATABASE
1072
USER APPROVED
1070
1076
DECRYPT
ADMIN. OBJECT KEY AND DATA
PLAINTEXT
CHECK ELEMENT INTEGRITY BY CHECK VALUE AND DIGITAL SIGNATURE TESTS
1078
PLAINTEXT CHECKED
1080
ENCRYPT
MGT. FILE KEY AND DATA
ENCRYPTED DATA
1082
TAG AND ENCRYPTED WRAPPER
INSERT ITEM INTO SECURE DATABASE
TAG STORE
1084

FIG. 37

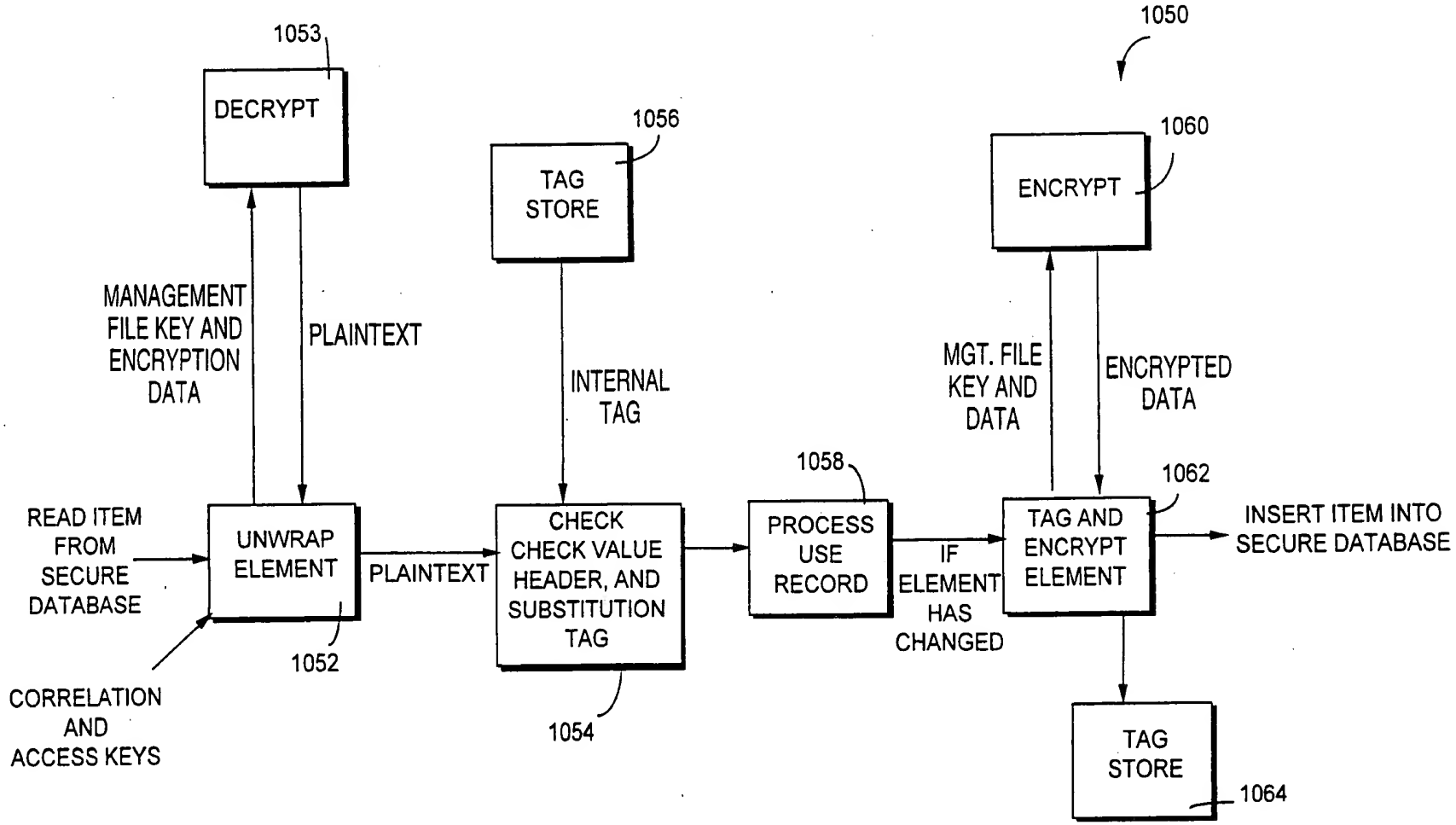

1050
1053
DECRYPT
1056
TAG STORE
1060
ENCRYPT
MANAGEMENT FILE KEY AND ENCRYPTION DATA
PLAINTEXT
INTERNAL TAG
MGT. FILE KEY AND DATA
ENCRYPTED DATA
1058
1062
READ ITEM FROM SECURE DATABASE
UNWRAP ELEMENT
PLAINTEXT
CHECK CHECK VALUE HEADER, AND SUBSTITUTION TAG
PROCESS USE RECORD
IF ELEMENT HAS CHANGED
TAG AND ENCRYPT ELEMENT
INSERT ITEM INTO SECURE DATABASE
1052
1054
CORRELATION AND ACCESS KEYS
TAG STORE
1064

FIG. 38

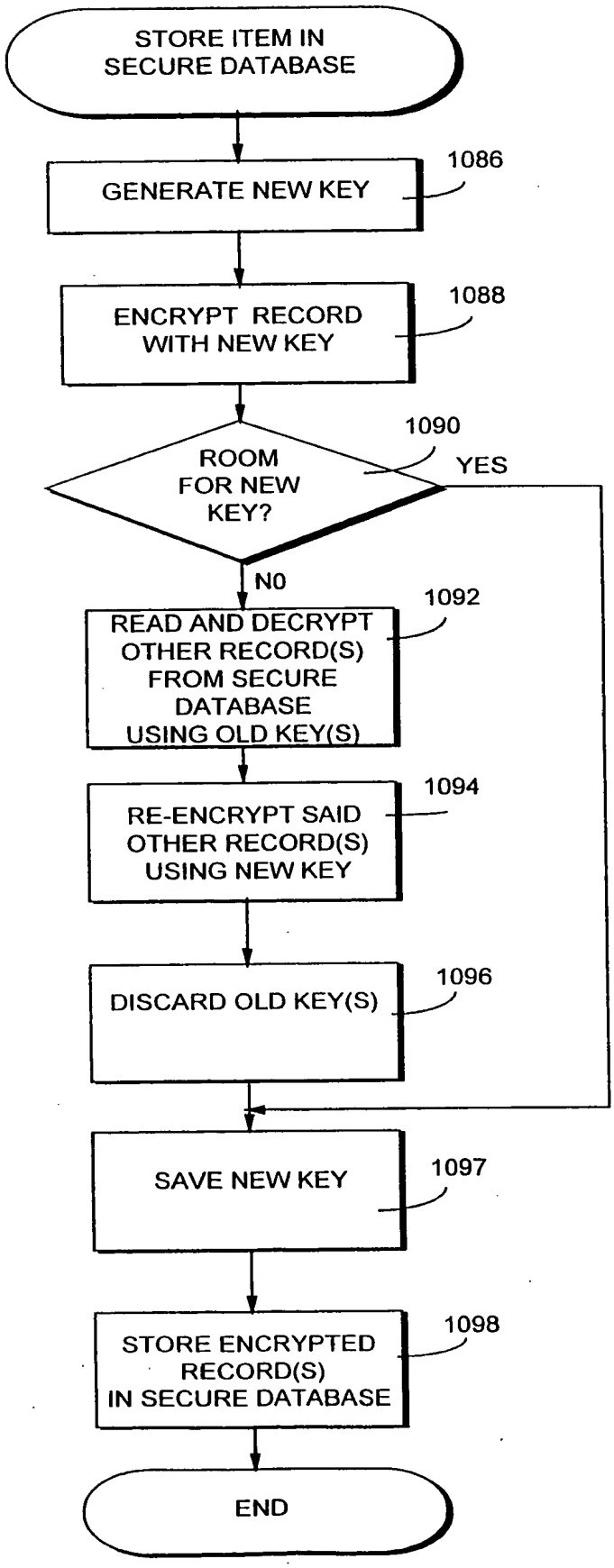

STORE ITEM IN SECURE DATABASE
GENERATE NEW KEY
1086
ENCRYPT RECORD WITH NEW KEY
1088
ROOM FOR NEW KEY?
1090
YES
NO
READ AND DECRYPT OTHER RECORD(S) FROM SECURE DATABASE USING OLD KEY(S)
1092
RE-ENCRYPT SAID OTHER RECORD(S) USING NEW KEY
1094
DISCARD OLD KEY(S)
1096
SAVE NEW KEY
1097
STORE ENCRYPTED RECORD(S) IN SECURE DATABASE
1098
END

FIG. 39

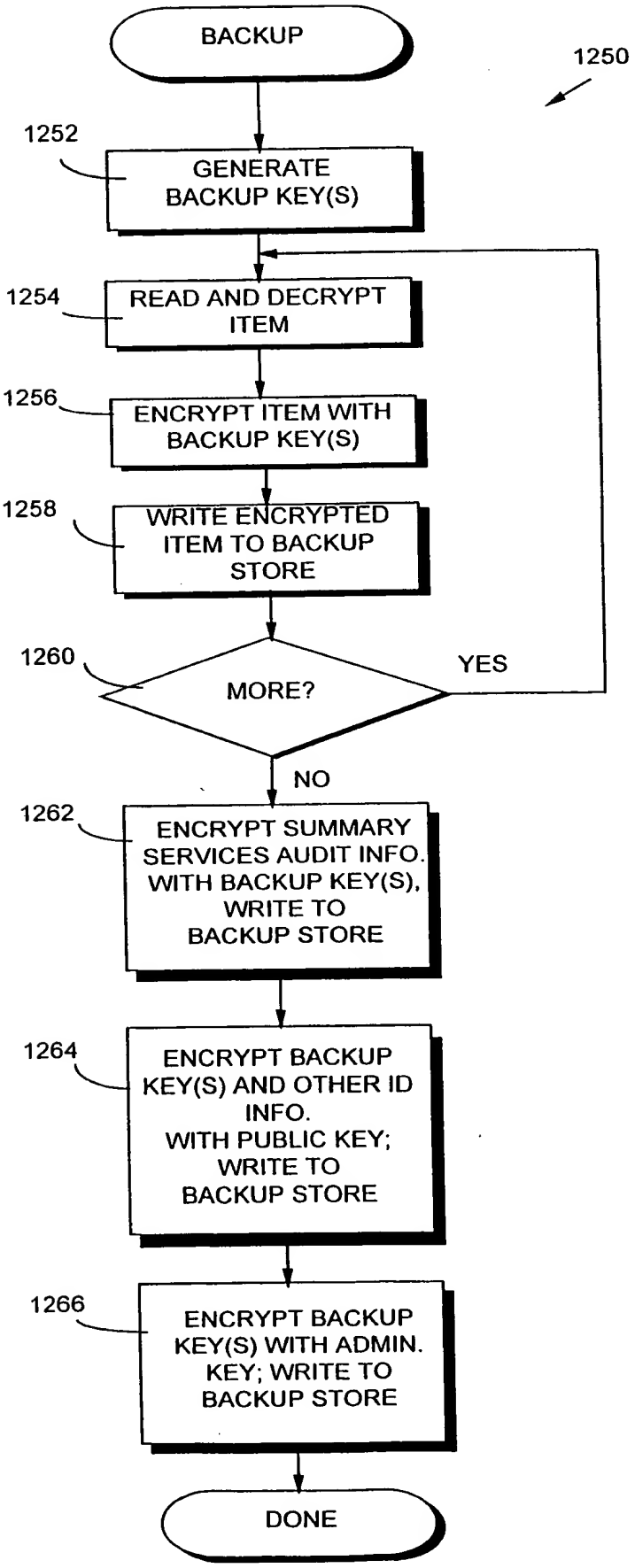
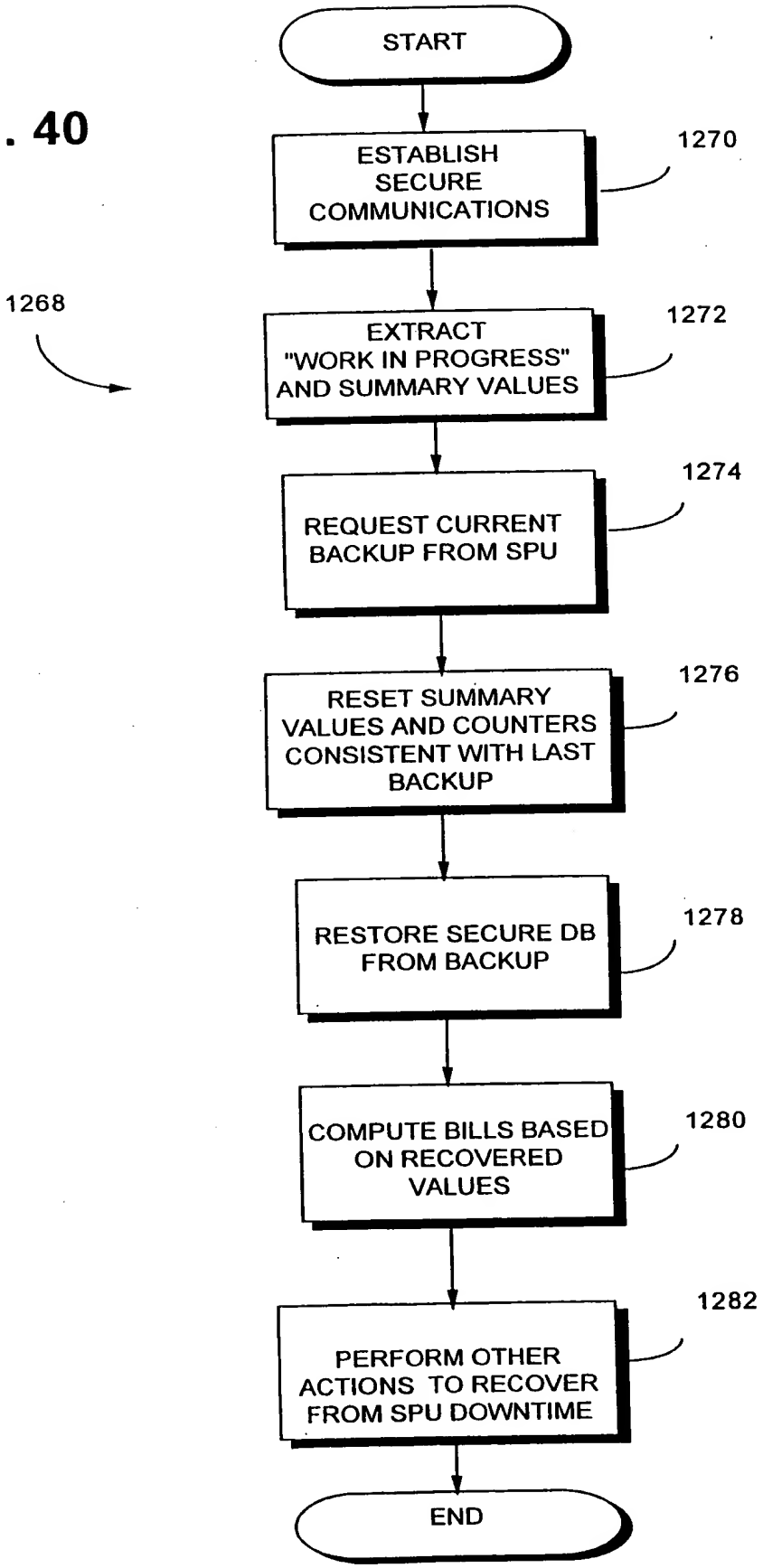

BACKUP
1250
1252
GENERATE BACKUP KEY(S)
1254
READ AND DECRYPT ITEM
1256
ENCRYPT ITEM WITH BACKUP KEY(S)
1258
WRITE ENCRYPTED ITEM TO BACKUP STORE
1260
MORE?
YES
NO
1262
ENCRYPT SUMMARY SERVICES AUDIT INFO. WITH BACKUP KEY(S), WRITE TO BACKUP STORE
1264
ENCRYPT BACKUP KEY(S) AND OTHER ID INFO. WITH PUBLIC KEY; WRITE TO BACKUP STORE
1266
ENCRYPT BACKUP KEY(S) WITH ADMIN. KEY; WRITE TO BACKUP STORE
DONE

FIG. 40


START
ESTABLISH SECURE COMMUNICATIONS
1270
1268
EXTRACT "WORK IN PROGRESS" AND SUMMARY VALUES
1272
REQUEST CURRENT BACKUP FROM SPU
1274
RESET SUMMARY VALUES AND COUNTERS CONSISTENT WITH LAST BACKUP
1276
RESTORE SECURE DB FROM BACKUP
1278
COMPUTE BILLS BASED ON RECOVERED VALUES
1280
PERFORM OTHER ACTIONS TO RECOVER FROM SPU DOWNTIME
1282
END

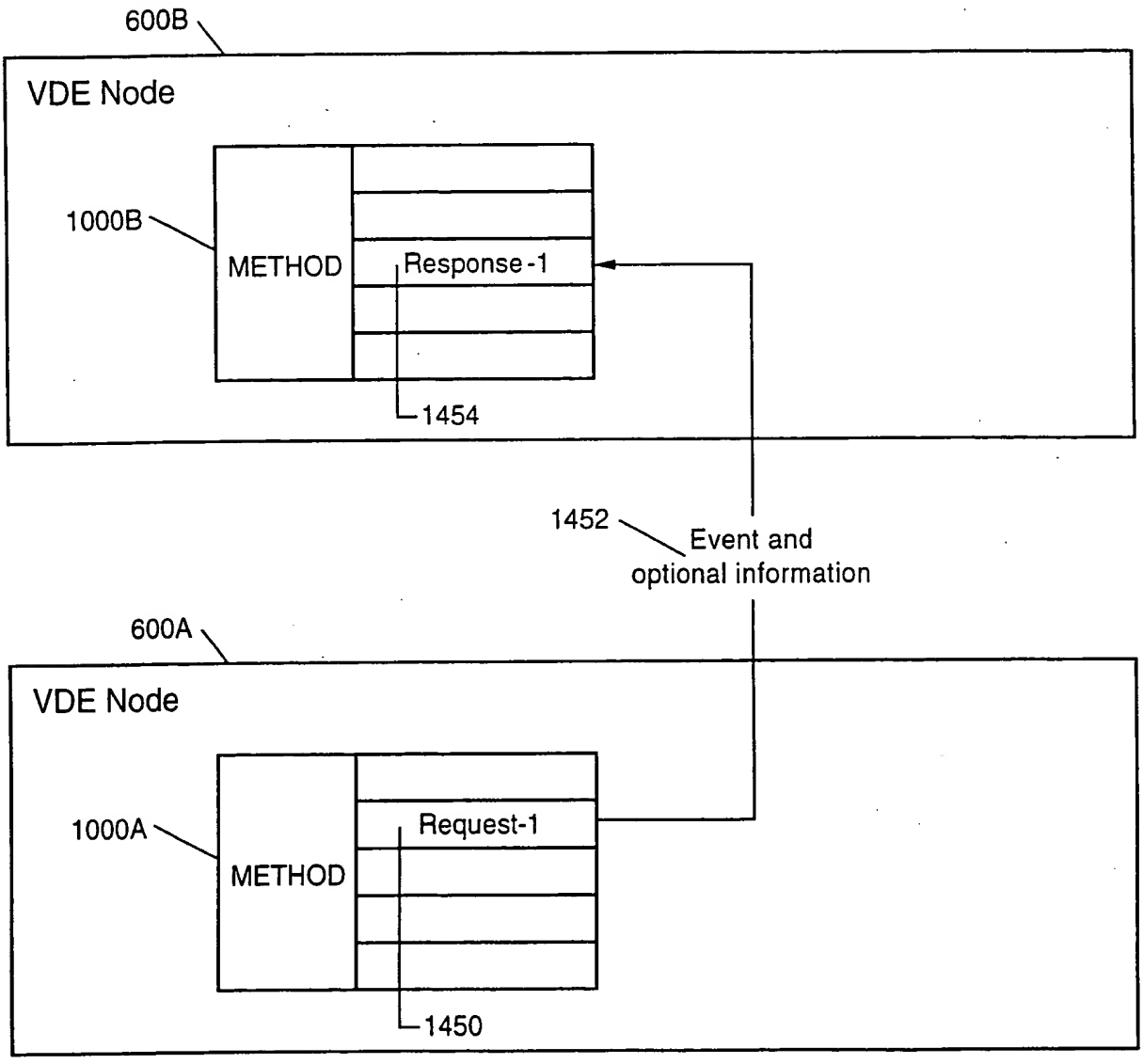

600B
VDE Node
1000B
METHOD
Response-1
1454
1452
Event and
optional information
600A
VDE Node
1000A
METHOD
Request-1
1450

FIG. 41a

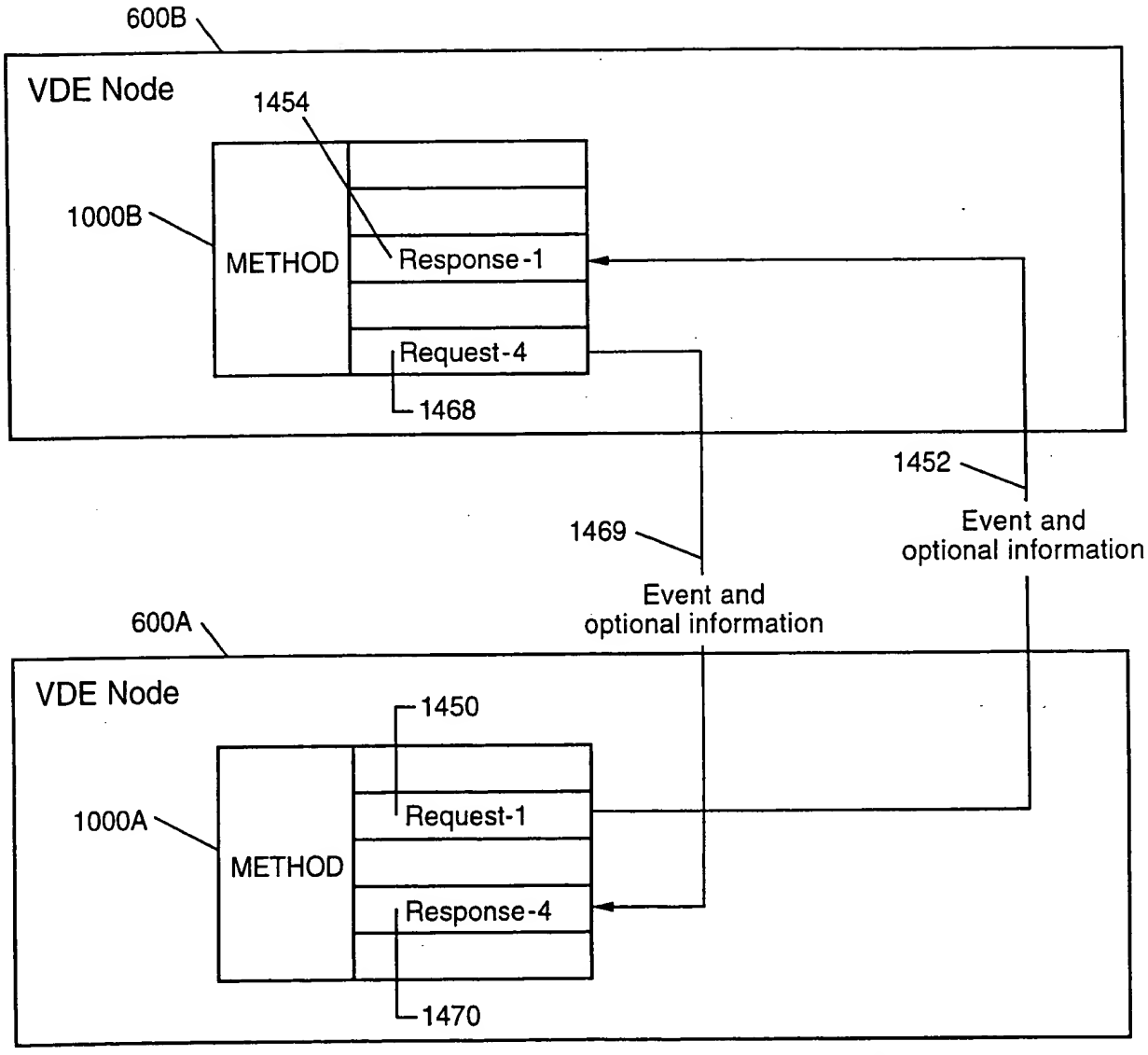

600B
VDE Node
1454
1000B
METHOD
Response-1
Request-4
1468
1452
Event and
optional information
1469
Event and
optional information
600A
VDE Node
1450
1000A
METHOD
Request-1
Response-4
1470

FIG. 41b

FIG. 41c

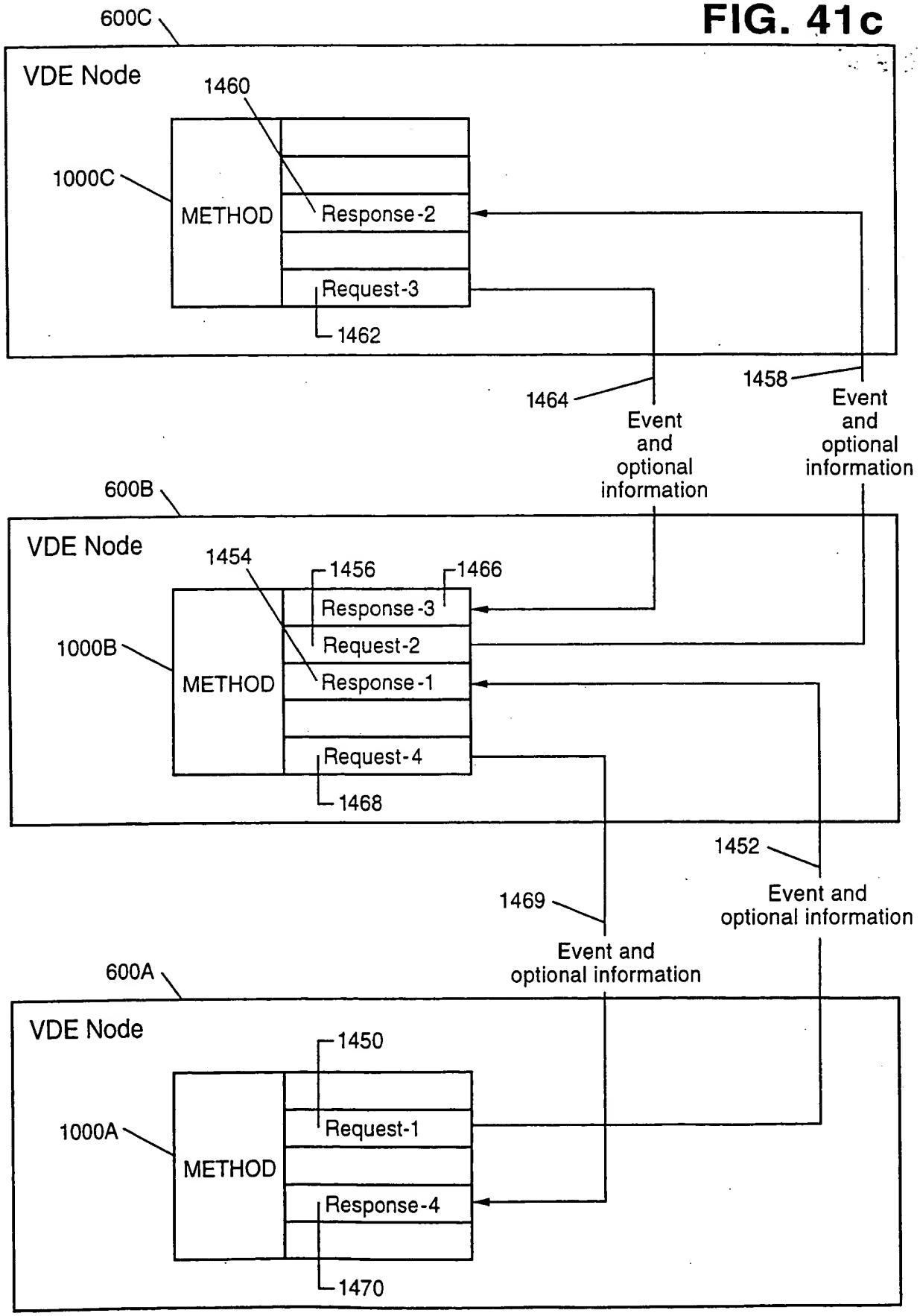
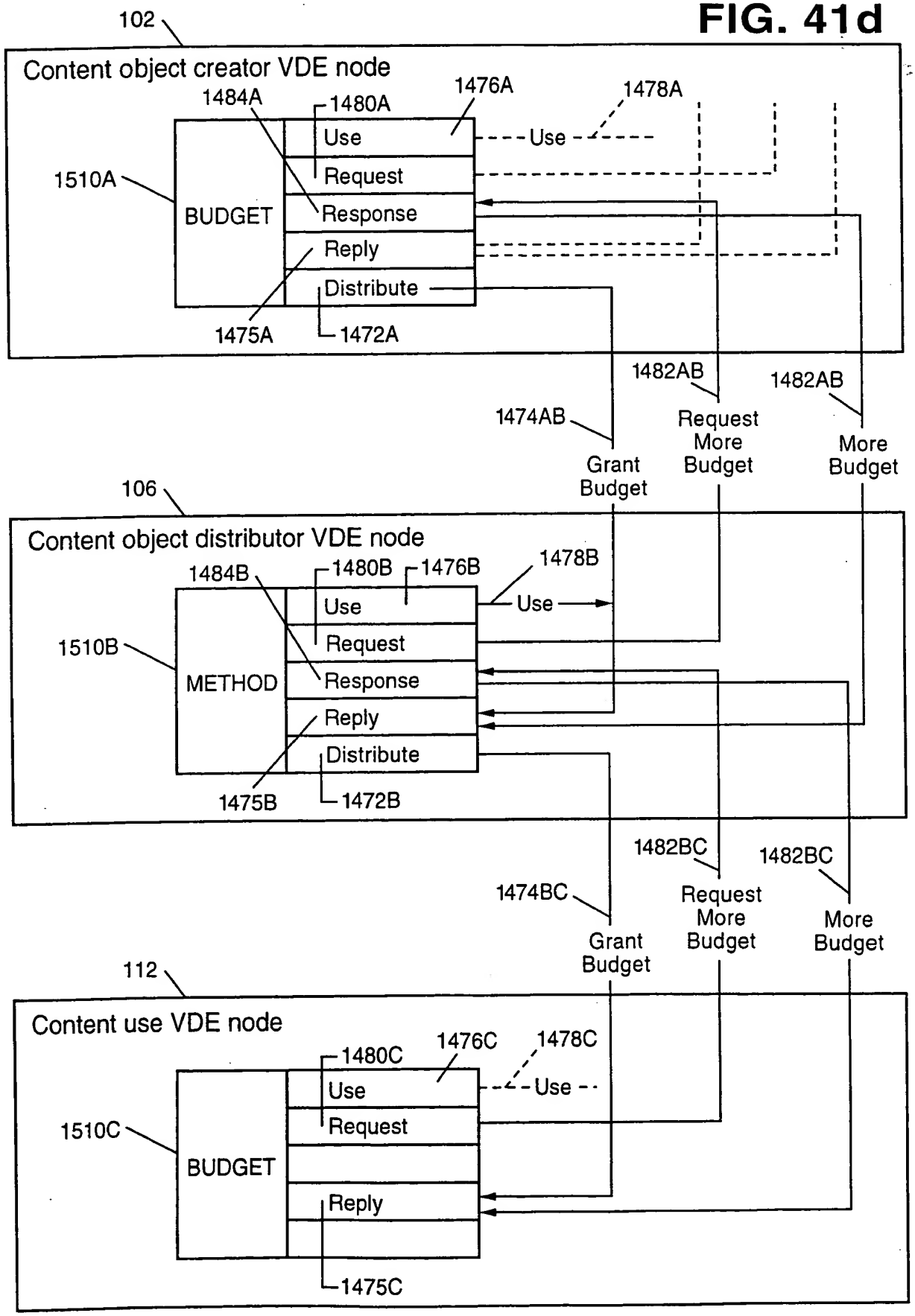

600C
VDE Node
1460
1000C
METHOD
Response-2
Request-3
1462
1464
Event and optional information
1458
Event and optional information
600B
VDE Node
1454
1456
1466
1000B
METHOD
Response-3
Request-2
Response-1
Request-4
1468
1452
Event and optional information
1469
Event and optional information
600A
VDE Node
1450
1000A
METHOD
Request-1
Response-4
1470

FIG. 41d


102
Content object creator VDE node
1484A
1480A
1476A
1478A
Use
Use
1510A
BUDGET
Request
Response
Reply
Distribute
1475A
1472A
1482AB
1482AB
1474AB
Request More Budget
More Budget
Grant Budget
106
Content object distributor VDE node
1484B
1480B
1476B
1478B
Use
Use
1510B
METHOD
Request
Response
Reply
Distribute
1475B
1472B
1482BC
1482BC
1474BC
Request More Budget
More Budget
Grant Budget
112
Content use VDE node
1480C
1476C
1478C
Use
Use
1510C
BUDGET
Request
Reply
1475C

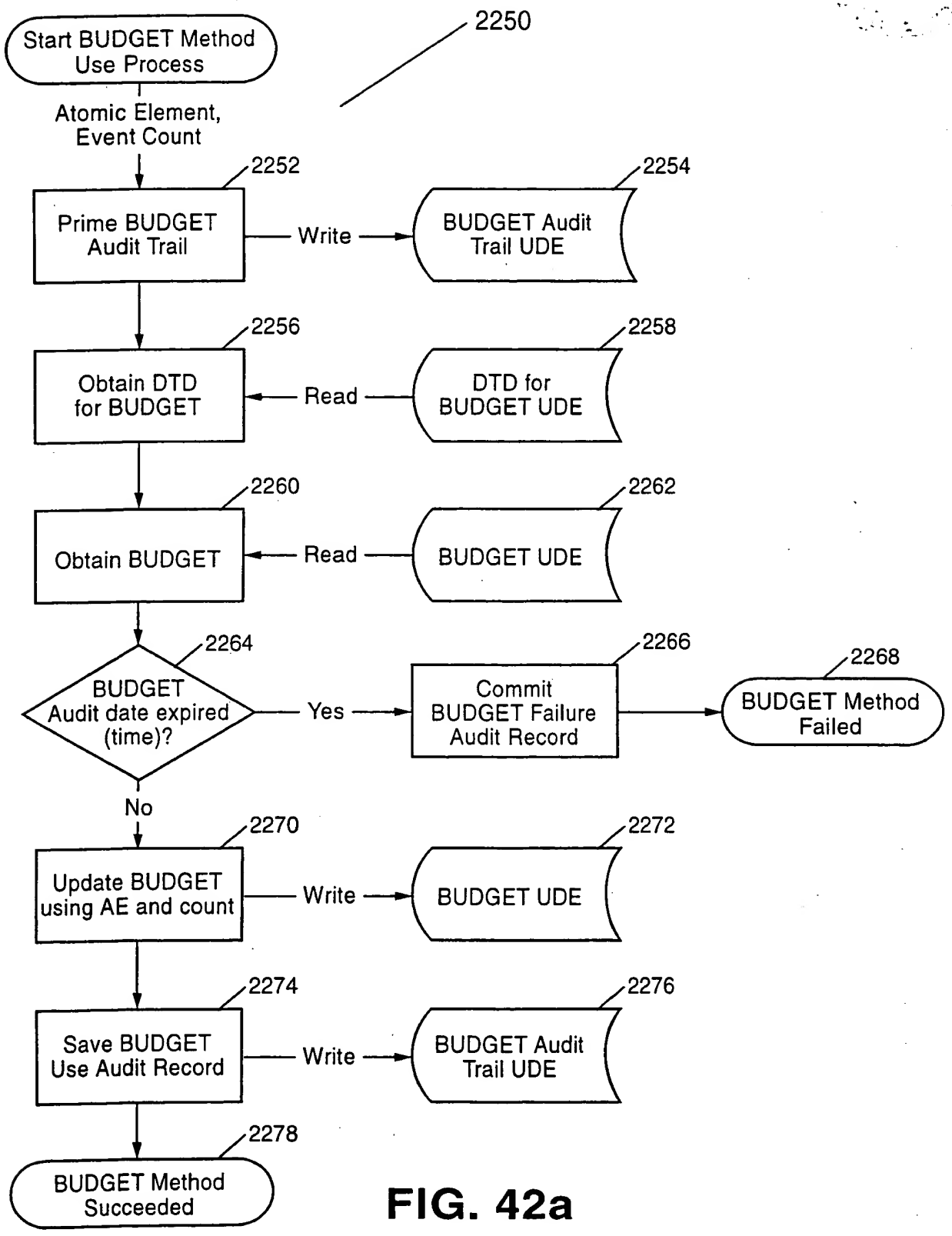

2250
Start BUDGET Method Use Process
Atomic Element, Event Count
2252
Prime BUDGET Audit Trail
Write
2254
BUDGET Audit Trail UDE
2256
Obtain DTD for BUDGET
Read
2258
DTD for BUDGET UDE
2260
Obtain BUDGET
Read
2262
BUDGET UDE
2264
BUDGET Audit date expired (time)?
Yes
2266
Commit BUDGET Failure Audit Record
2268
BUDGET Method Failed
No
2270
Update BUDGET using AE and count
Write
2272
BUDGET UDE
2274
Save BUDGET Use Audit Record
Write
2276
BUDGET Audit Trail UDE
2278
BUDGET Method Succeeded

FIG. 42a

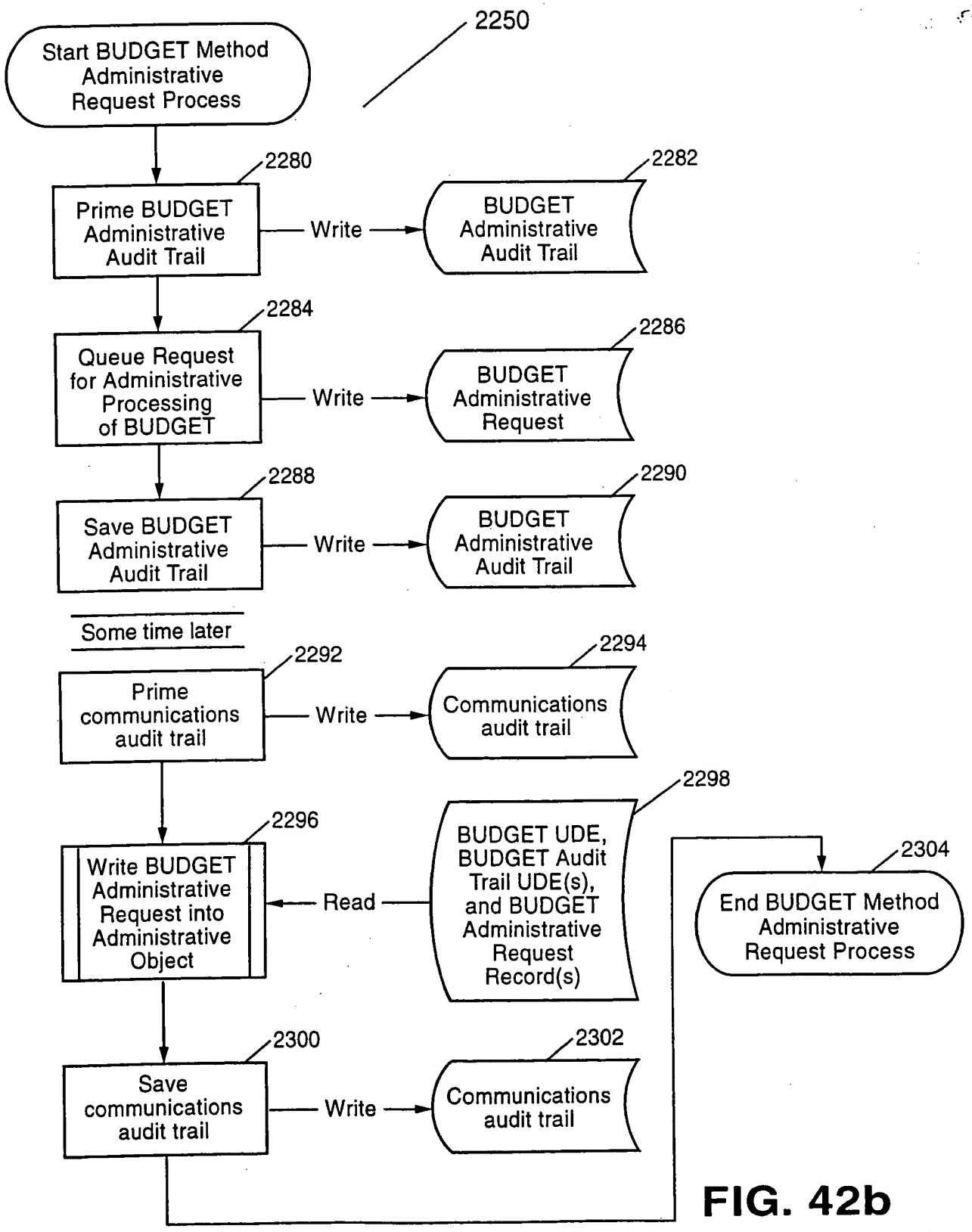

2250
Start BUDGET Method Administrative Request Process
2280
Prime BUDGET Administrative Audit Trail
Write
2282
BUDGET Administrative Audit Trail
2284
Queue Request for Administrative Processing of BUDGET
Write
2286
BUDGET Administrative Request
2288
Save BUDGET Administrative Audit Trail
Write
2290
BUDGET Administrative Audit Trail
Some time later
2292
Prime communications audit trail
Write
2294
Communications audit trail
2296
Write BUDGET Administrative Request into Administrative Object
Read
2298
BUDGET UDE, BUDGET Audit Trail UDE(s), and BUDGET Administrative Request Record(s)
2304
End BUDGET Method Administrative Request Process
2300
Save communications audit trail
Write
2302
Communications audit trail

FIG. 42b

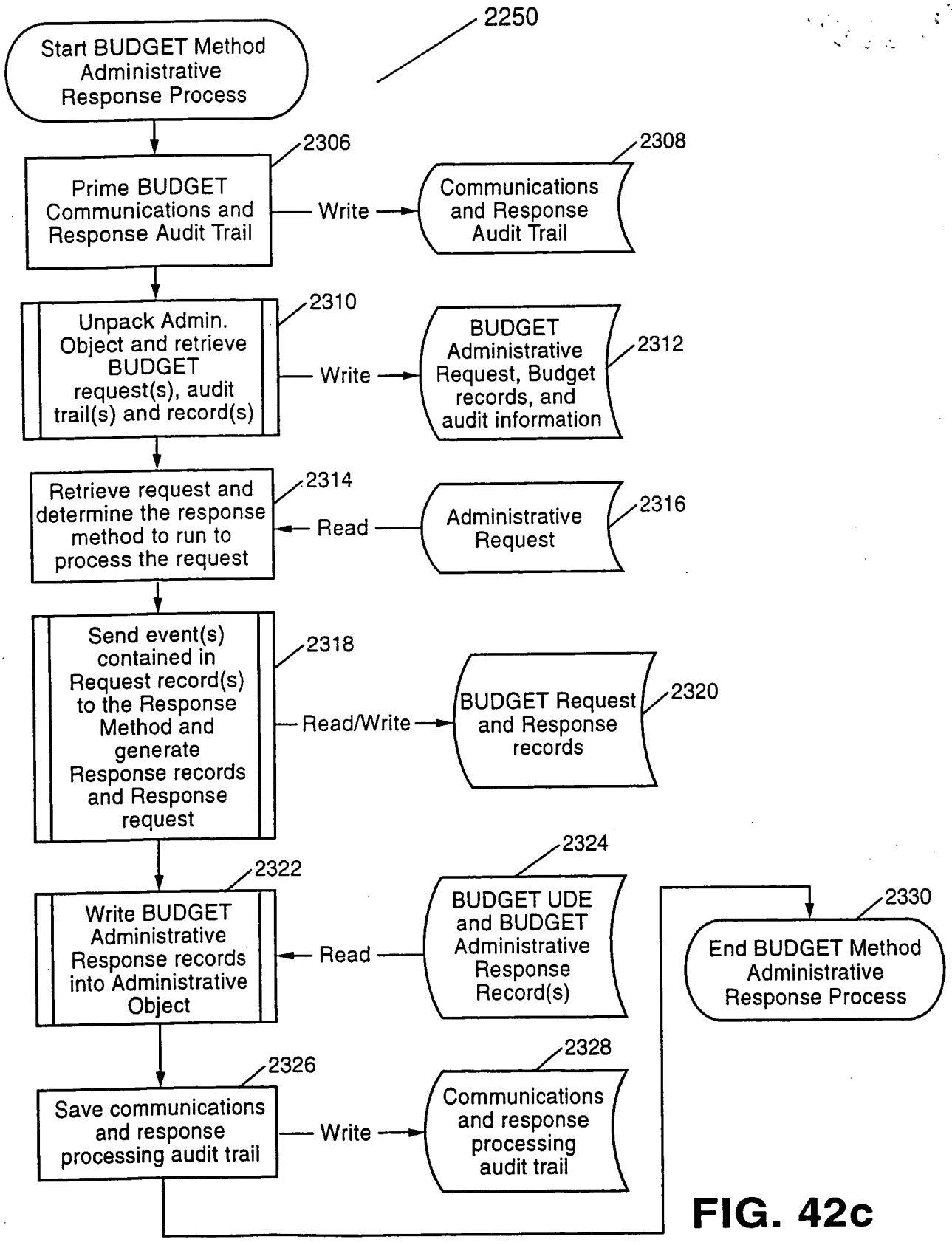

2250
Start BUDGET Method Administrative Response Process
2306
Prime BUDGET Communications and Response Audit Trail
Write
2308
Communications and Response Audit Trail
2310
Unpack Admin. Object and retrieve BUDGET request(s), audit trail(s) and record(s)
Write
BUDGET Administrative Request, Budget records, and audit information
2312
2314
Retrieve request and determine the response method to run to process the request
Read
Administrative Request
2316
2318
Send event(s) contained in Request record(s) to the Response Method and generate Response records and Response request
Read/Write
BUDGET Request and Response records
2320
2322
Write BUDGET Administrative Response records into Administrative Object
Read
2324
BUDGET UDE and BUDGET Administrative Response Record(s)
2326
Save communications and response processing audit trail
Write
2328
Communications and response processing audit trail
2330
End BUDGET Method Administrative Response Process

FIG. 42c

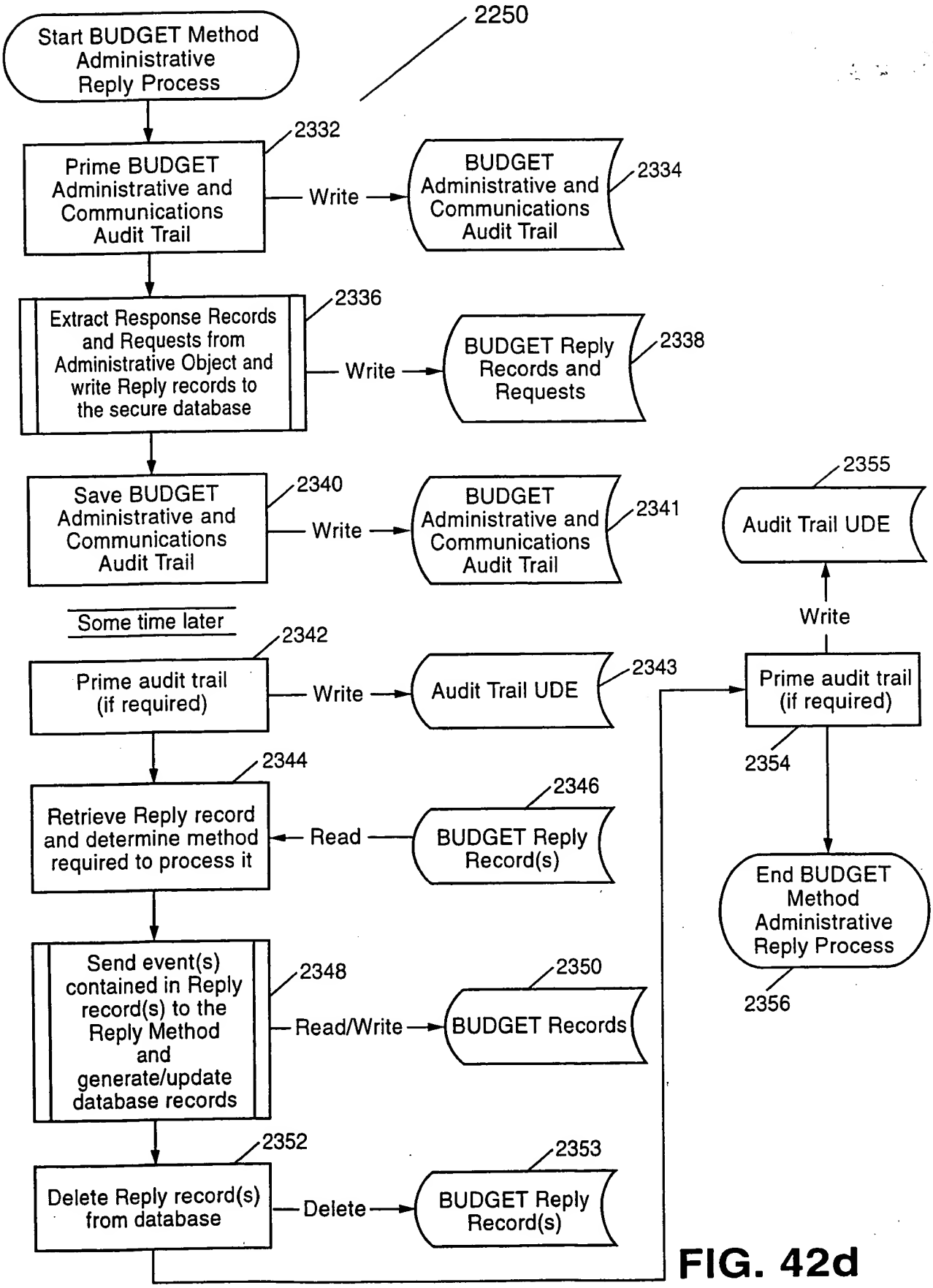

Start BUDGET Method Administrative Reply Process
2250
2332
Prime BUDGET Administrative and Communications Audit Trail
Write
BUDGET Administrative and Communications Audit Trail
2334
2336
Extract Response Records and Requests from Administrative Object and write Reply records to the secure database
Write
BUDGET Reply Records and Requests
2338
2340
Save BUDGET Administrative and Communications Audit Trail
Write
BUDGET Administrative and Communications Audit Trail
2341
2355
Audit Trail UDE
Write
Some time later
2342
Prime audit trail (if required)
Write
Audit Trail UDE
2343
Prime audit trail (if required)
2354
2344
Retrieve Reply record and determine method required to process it
Read
2346
BUDGET Reply Record(s)
End BUDGET Method Administrative Reply Process
2356
2348
Send event(s) contained in Reply record(s) to the Reply Method and generate/update database records
Read/Write
2350
BUDGET Records
2352
Delete Reply record(s) from database
Delete
2353
BUDGET Reply Record(s)

FIG. 42d

FIG. 43a

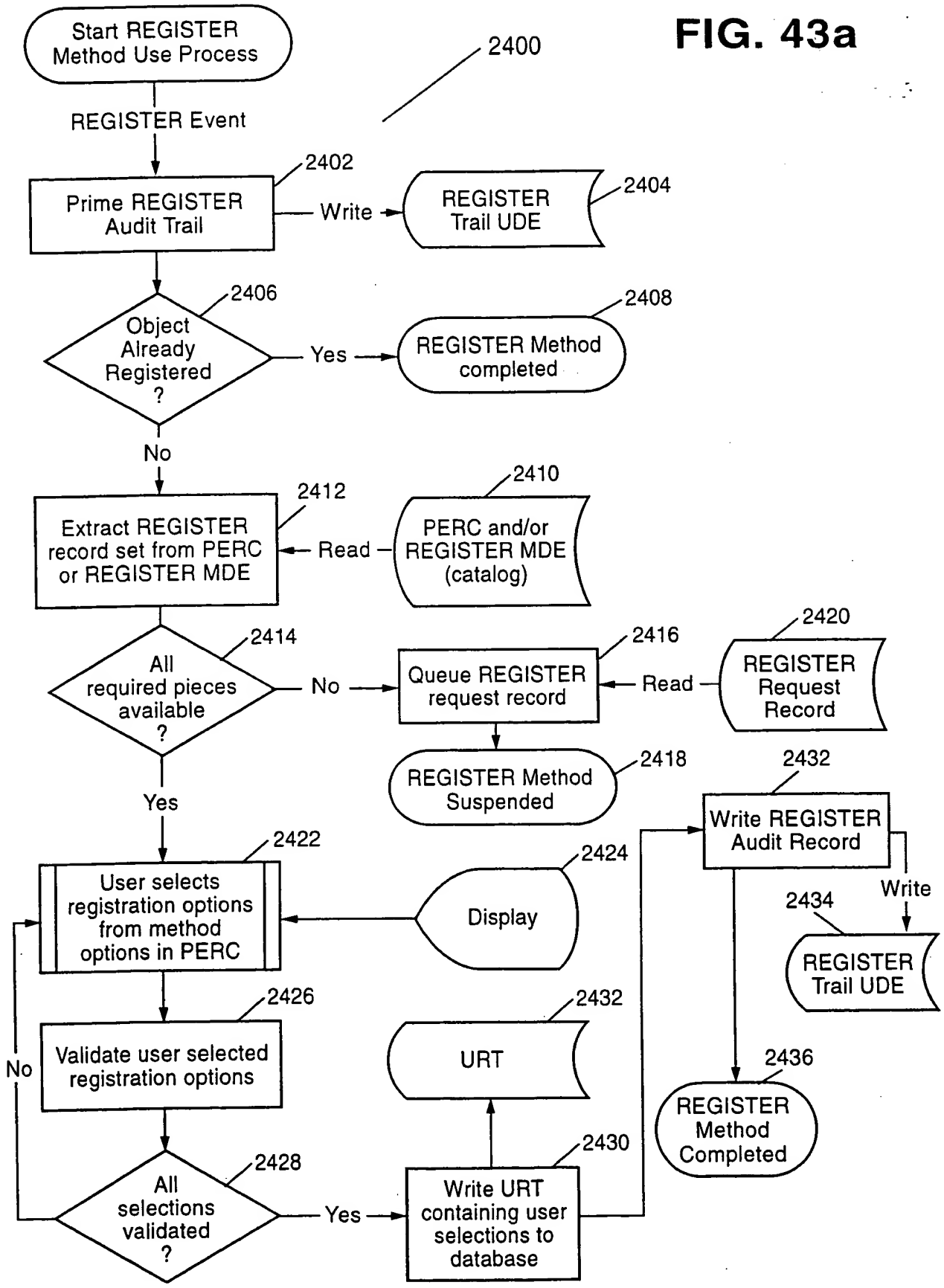
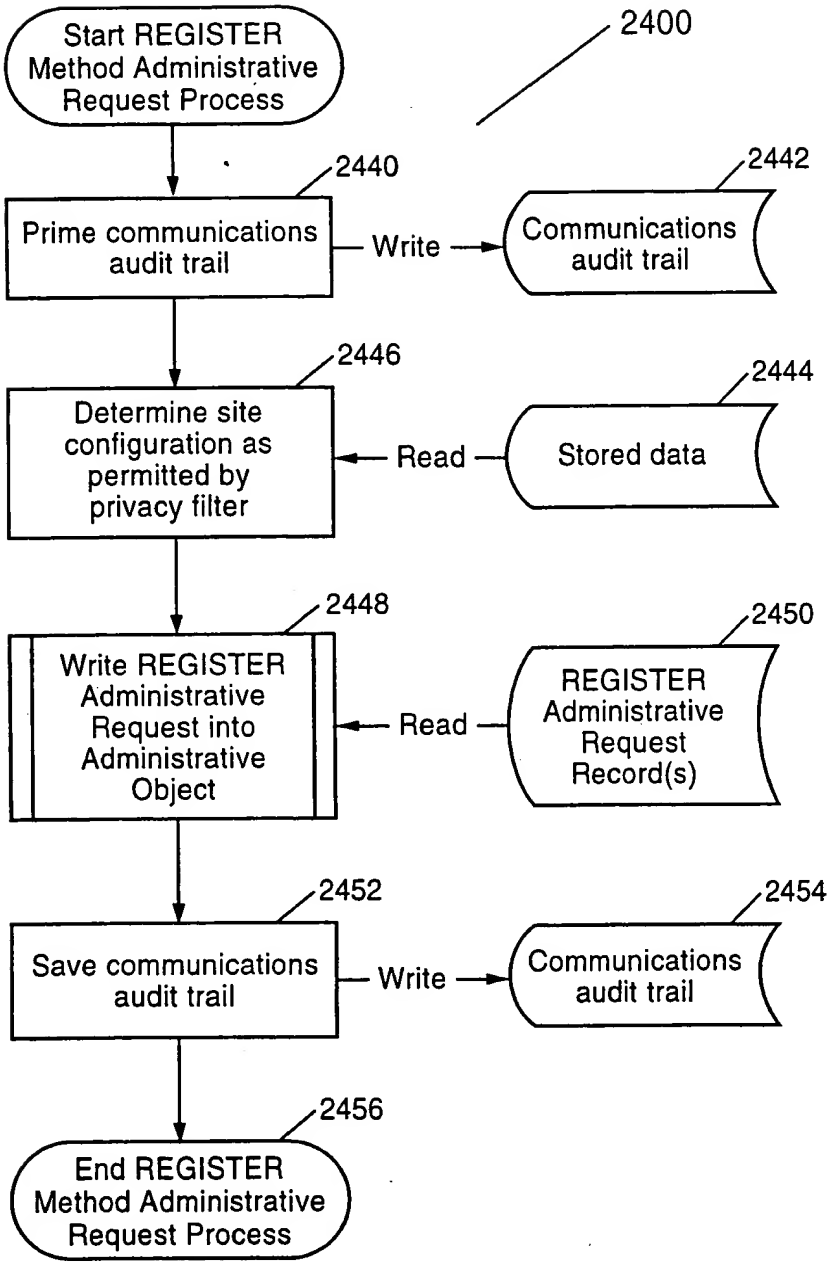
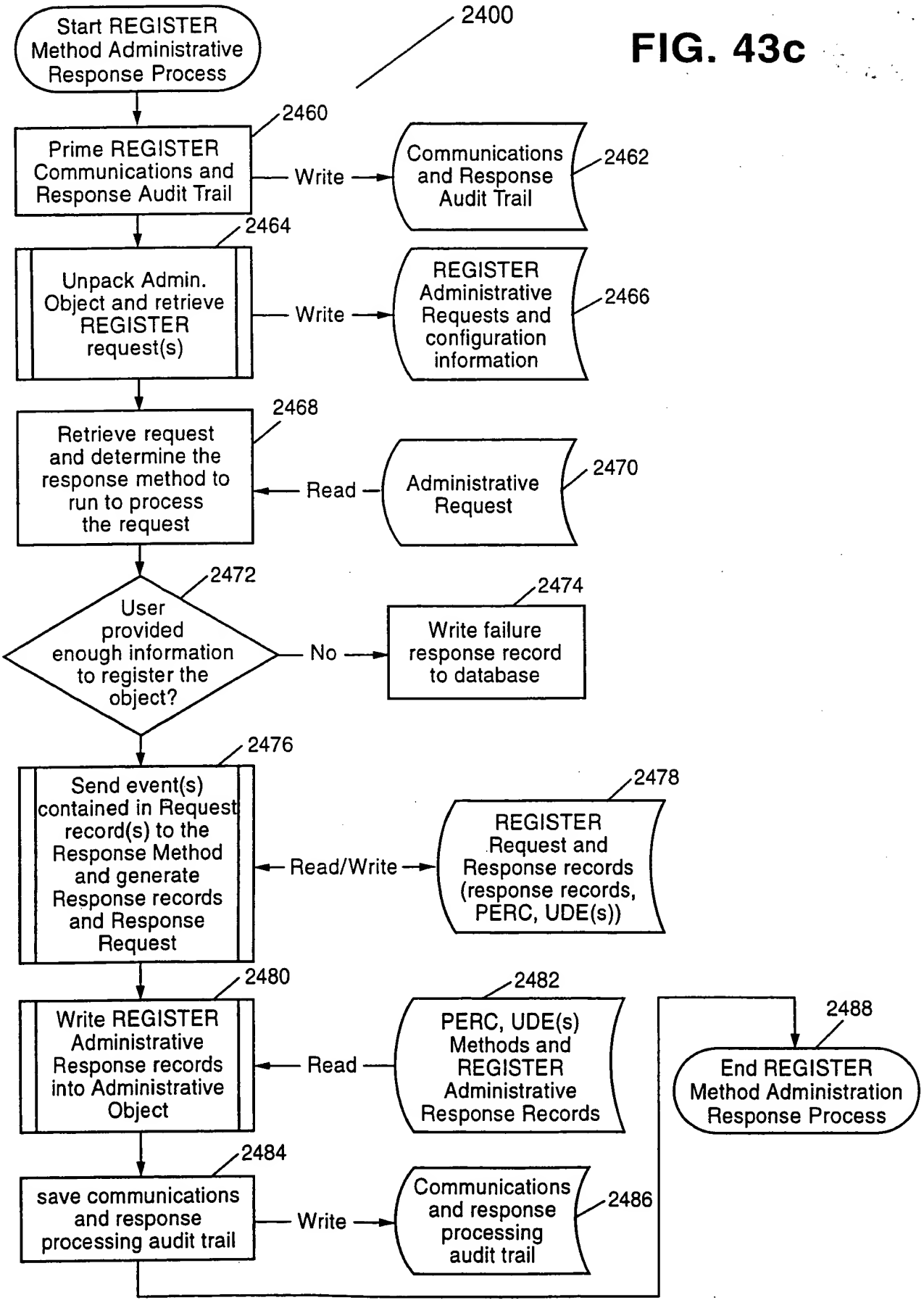

Start REGISTER Method Use Process
2400
REGISTER Event
2402
Prime REGISTER Audit Trail
Write
REGISTER Trail UDE
2404
2406
Object Already Registered ?
Yes
REGISTER Method completed
2408
No
2410
2412
Extract REGISTER record set from PERC or REGISTER MDE
Read
PERC and/or REGISTER MDE (catalog)
2414
All required pieces available ?
No
2416
Queue REGISTER request record
Read
2420
REGISTER Request Record
REGISTER Method Suspended
2418
Yes
2422
User selects registration options from method options in PERC
2424
Display
2426
Validate user selected registration options
No
2428
All selections validated ?
Yes
2430
Write URT containing user selections to database
2432
URT
2432
Write REGISTER Audit Record
Write
2434
REGISTER Trail UDE
2436
REGISTER Method Completed

FIG. 43b


Start REGISTER Method Administrative Request Process
2400
2440
Prime communications audit trail
Write
2442
Communications audit trail
2446
Determine site configuration as permitted by privacy filter
Read
2444
Stored data
2448
Write REGISTER Administrative Request into Administrative Object
Read
2450
REGISTER Administrative Request Record(s)
2452
Save communications audit trail
Write
2454
Communications audit trail
2456
End REGISTER Method Administrative Request Process


Start REGISTER Method Administrative Response Process
2400
FIG. 43c
2460
Prime REGISTER Communications and Response Audit Trail
Write
Communications and Response Audit Trail
2462
2464
Unpack Admin. Object and retrieve REGISTER request(s)
Write
REGISTER Administrative Requests and configuration information
2466
2468
Retrieve request and determine the response method to run to process the request
Read
Administrative Request
2470
2472
User provided enough information to register the object?
No
2474
Write failure response record to database
2476
Send event(s) contained in Request record(s) to the Response Method and generate Response records and Response Request
Read/Write
2478
REGISTER Request and Response records (response records, PERC, UDE(s))
2480
Write REGISTER Administrative Response records into Administrative Object
Read
2482
PERC, UDE(s) Methods and REGISTER Administrative Response Records
2488
End REGISTER Method Administration Response Process
2484
save communications and response processing audit trail
Write
Communications and response processing audit trail
2486

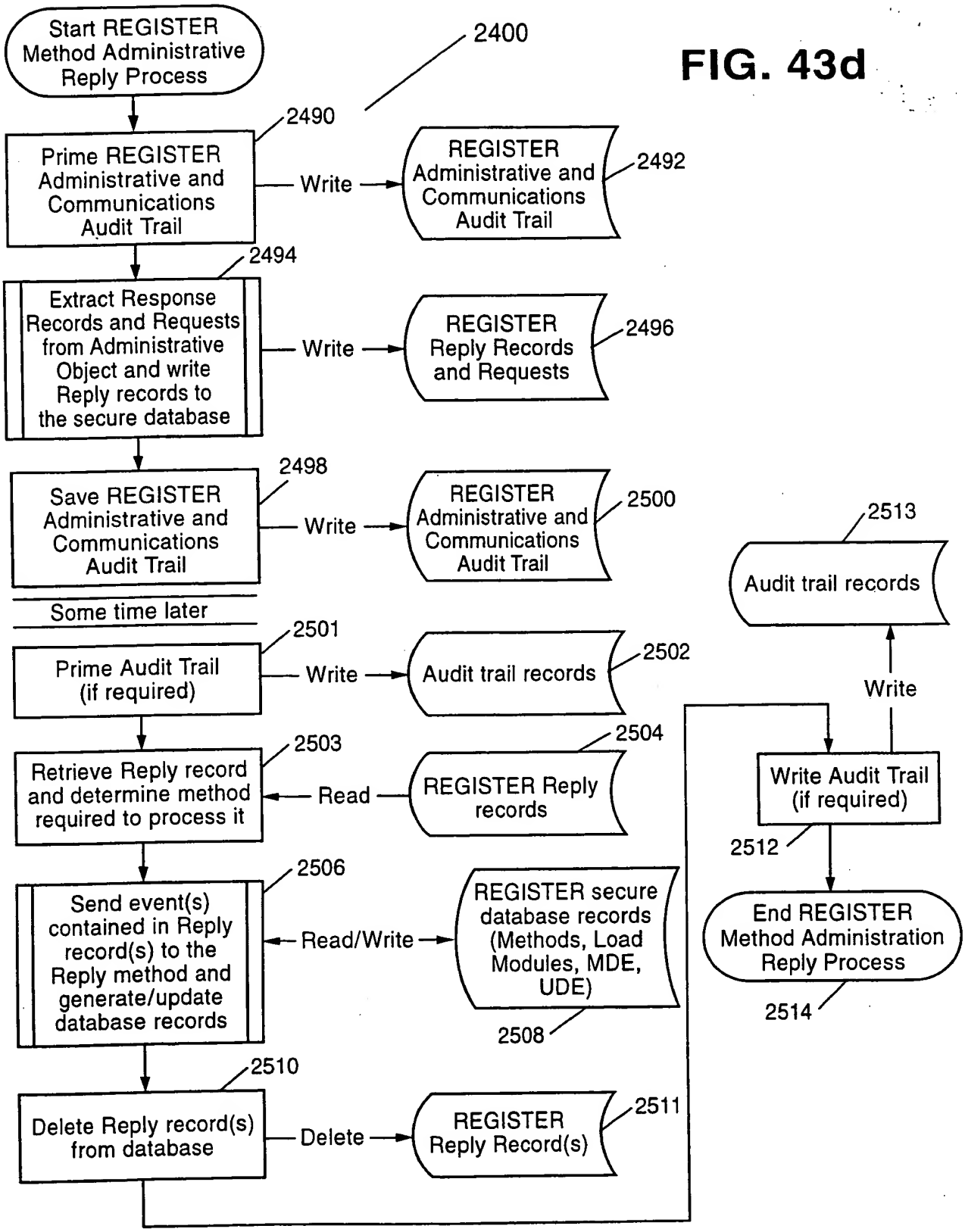

Start REGISTER Method Administrative Reply Process
2400
2490
Prime REGISTER Administrative and Communications Audit Trail
Write
REGISTER Administrative and Communications Audit Trail
2492
2494
Extract Response Records and Requests from Administrative Object and write Reply records to the secure database
Write
REGISTER Reply Records and Requests
2496
2498
Save REGISTER Administrative and Communications Audit Trail
Write
REGISTER Administrative and Communications Audit Trail
2500
Some time later
2501
Prime Audit Trail (if required)
Write
Audit trail records
2502
2503
Retrieve Reply record and determine method required to process it
Read
REGISTER Reply records
2504
2506
Send event(s) contained in Reply record(s) to the Reply method and generate/update database records
Read/Write
REGISTER secure database records (Methods, Load Modules, MDE, UDE)
2508
2510
Delete Reply record(s) from database
Delete
REGISTER Reply Record(s)
2511
2513
Audit trail records
Write
Write Audit Trail (if required)
2512
End REGISTER Method Administration Reply Process
2514

FIG. 43d

FIG. 44a

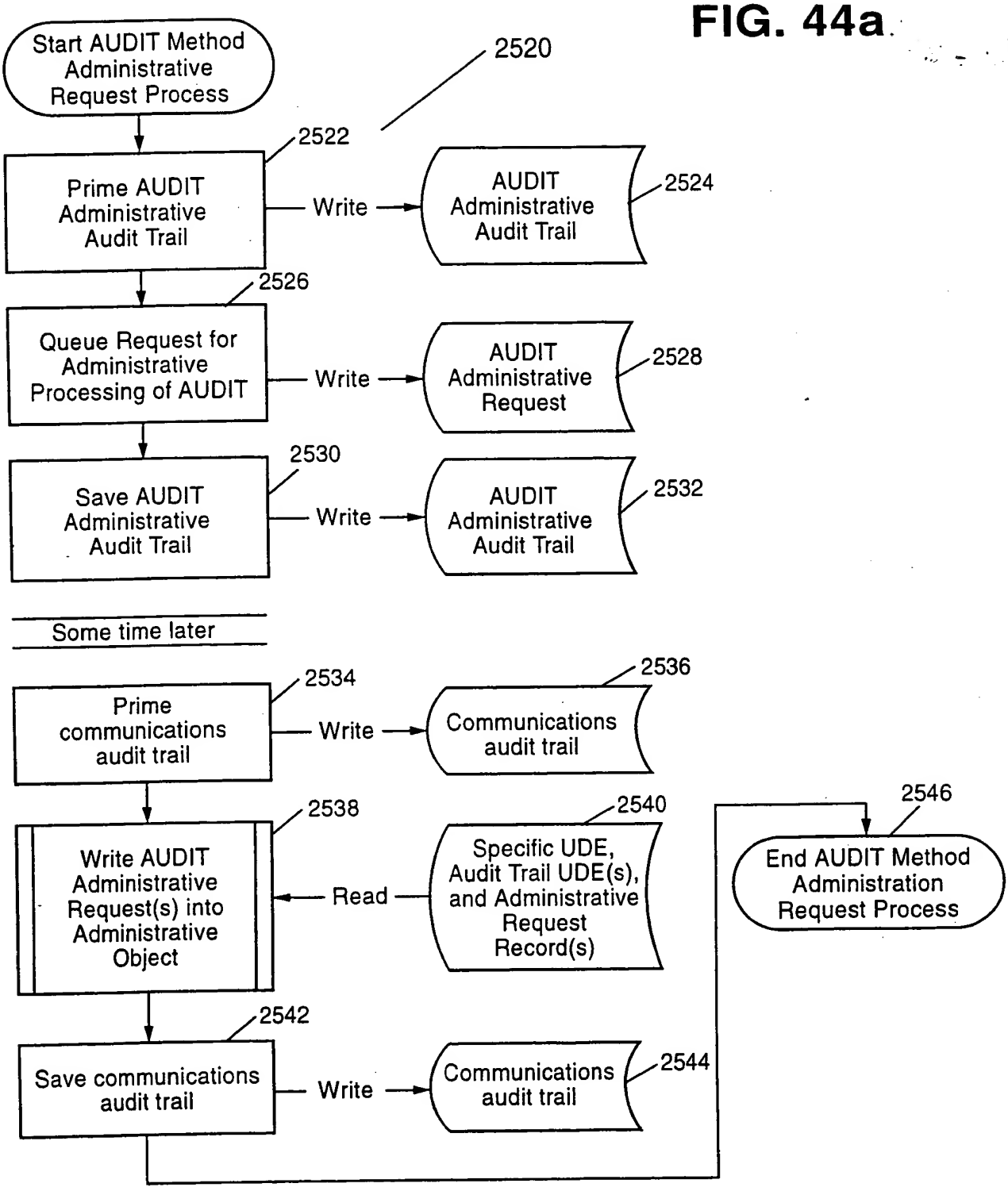

Start AUDIT Method Administrative Request Process
2520
2522
Prime AUDIT Administrative Audit Trail
Write
AUDIT Administrative Audit Trail
2524
2526
Queue Request for Administrative Processing of AUDIT
Write
AUDIT Administrative Request
2528
2530
Save AUDIT Administrative Audit Trail
Write
AUDIT Administrative Audit Trail
2532
Some time later
2534
Prime communications audit trail
Write
Communications audit trail
2536
2538
Write AUDIT Administrative Request(s) into Administrative Object
Read
Specific UDE, Audit Trail UDE(s), and Administrative Request Record(s)
2540
2542
Save communications audit trail
Write
Communications audit trail
2544
2546
End AUDIT Method Administration Request Process

FIG. 44b

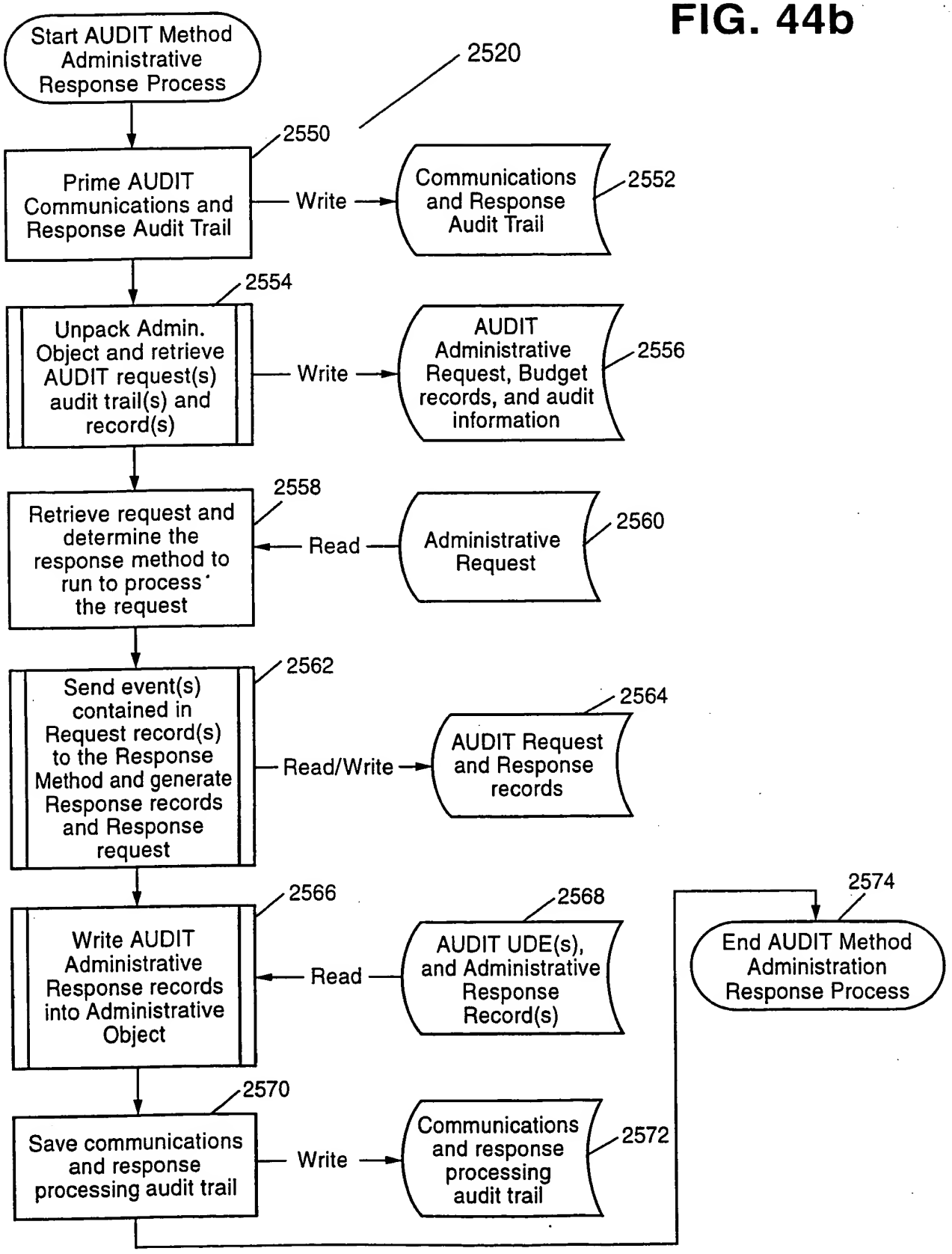

Start AUDIT Method Administrative Response Process
2520
2550
Prime AUDIT Communications and Response Audit Trail
Write
Communications and Response Audit Trail
2552
2554
Unpack Admin. Object and retrieve AUDIT request(s) audit trail(s) and record(s)
Write
AUDIT Administrative Request, Budget records, and audit information
2556
2558
Retrieve request and determine the response method to run to process the request
Read
Administrative Request
2560
2562
Send event(s) contained in Request record(s) to the Response Method and generate Response records and Response request
Read/Write
AUDIT Request and Response records
2564
2566
Write AUDIT Administrative Response records into Administrative Object
Read
AUDIT UDE(s), and Administrative Response Record(s)
2568
2570
Save communications and response processing audit trail
Write
Communications and response processing audit trail
2572
2574
End AUDIT Method Administration Response Process

FIG. 44c

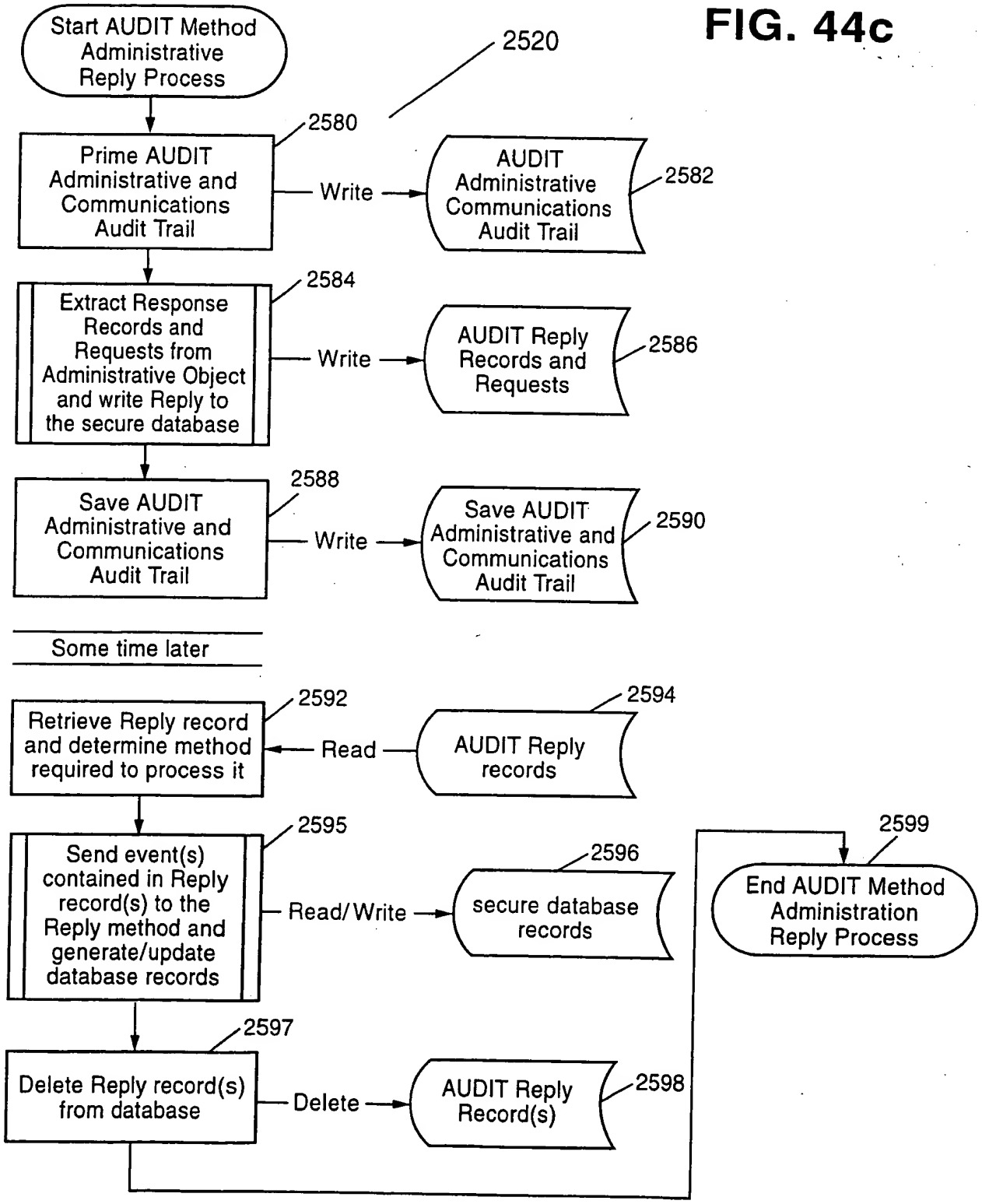

Start AUDIT Method Administrative Reply Process
2520
2580
Prime AUDIT Administrative and Communications Audit Trail
Write
AUDIT Administrative Communications Audit Trail
2582
2584
Extract Response Records and Requests from Administrative Object and write Reply to the secure database
Write
AUDIT Reply Records and Requests
2586
2588
Save AUDIT Administrative and Communications Audit Trail
Write
Save AUDIT Administrative and Communications Audit Trail
2590
Some time later
2592
Retrieve Reply record and determine method required to process it
Read
AUDIT Reply records
2594
2595
Send event(s) contained in Reply record(s) to the Reply method and generate/update database records
Read/Write
secure database records
2596
2599
End AUDIT Method Administration Reply Process
2597
Delete Reply record(s) from database
Delete
AUDIT Reply Record(s)
2598

FIG. 45

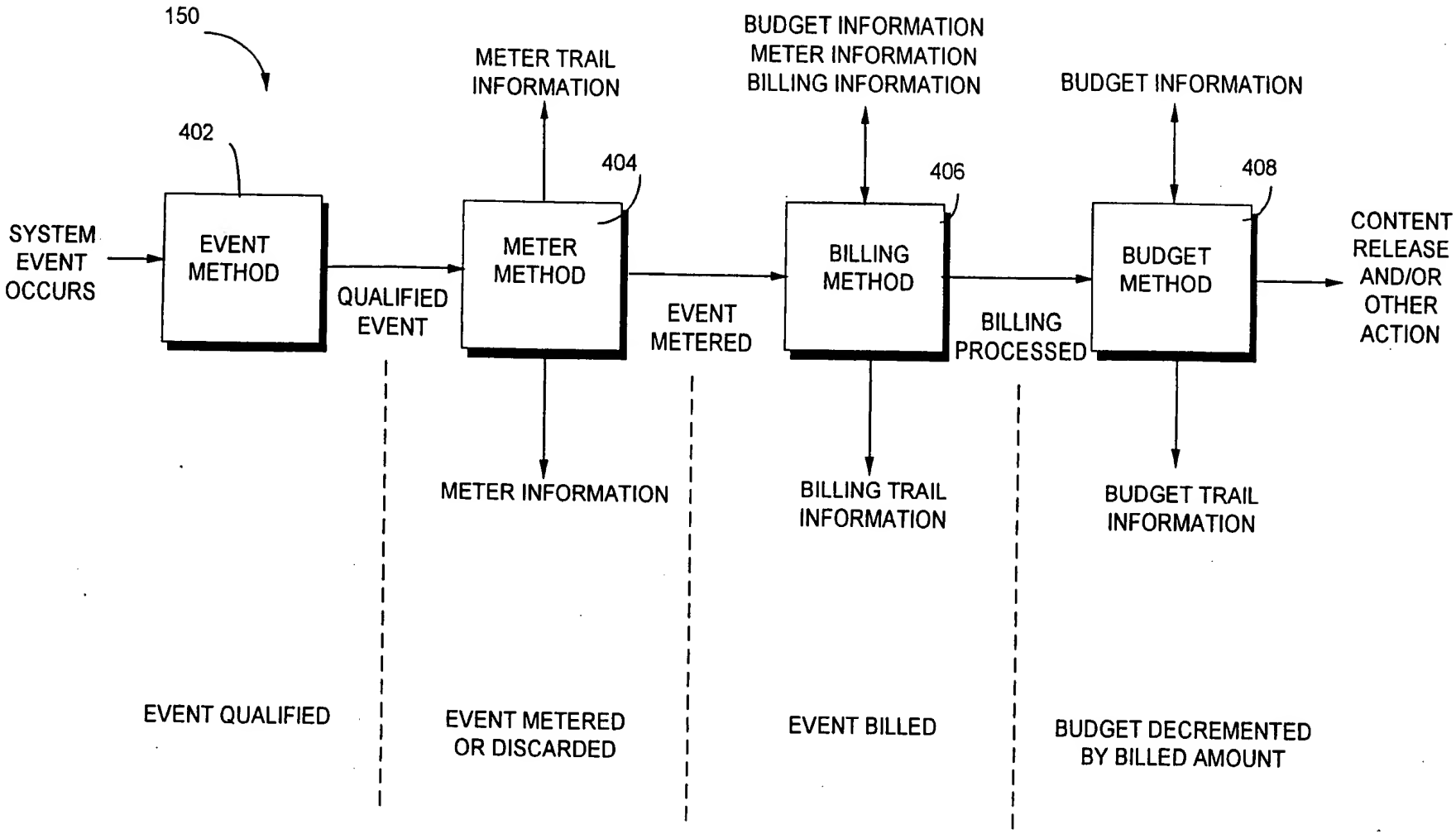

150
402
404
406
408
SYSTEM EVENT OCCURS
EVENT METHOD
QUALIFIED EVENT
METER METHOD
METER TRAIL INFORMATION
METER INFORMATION
EVENT METERED
BILLING METHOD
BUDGET INFORMATION METER INFORMATION BILLING INFORMATION
BILLING TRAIL INFORMATION
BILLING PROCESSED
BUDGET METHOD
BUDGET INFORMATION
BUDGET TRAIL INFORMATION
CONTENT RELEASE AND/OR OTHER ACTION
EVENT QUALIFIED
EVENT METERED OR DISCARDED
EVENT BILLED
BUDGET DECREMENTED BY BILLED AMOUNT

FIG. 46

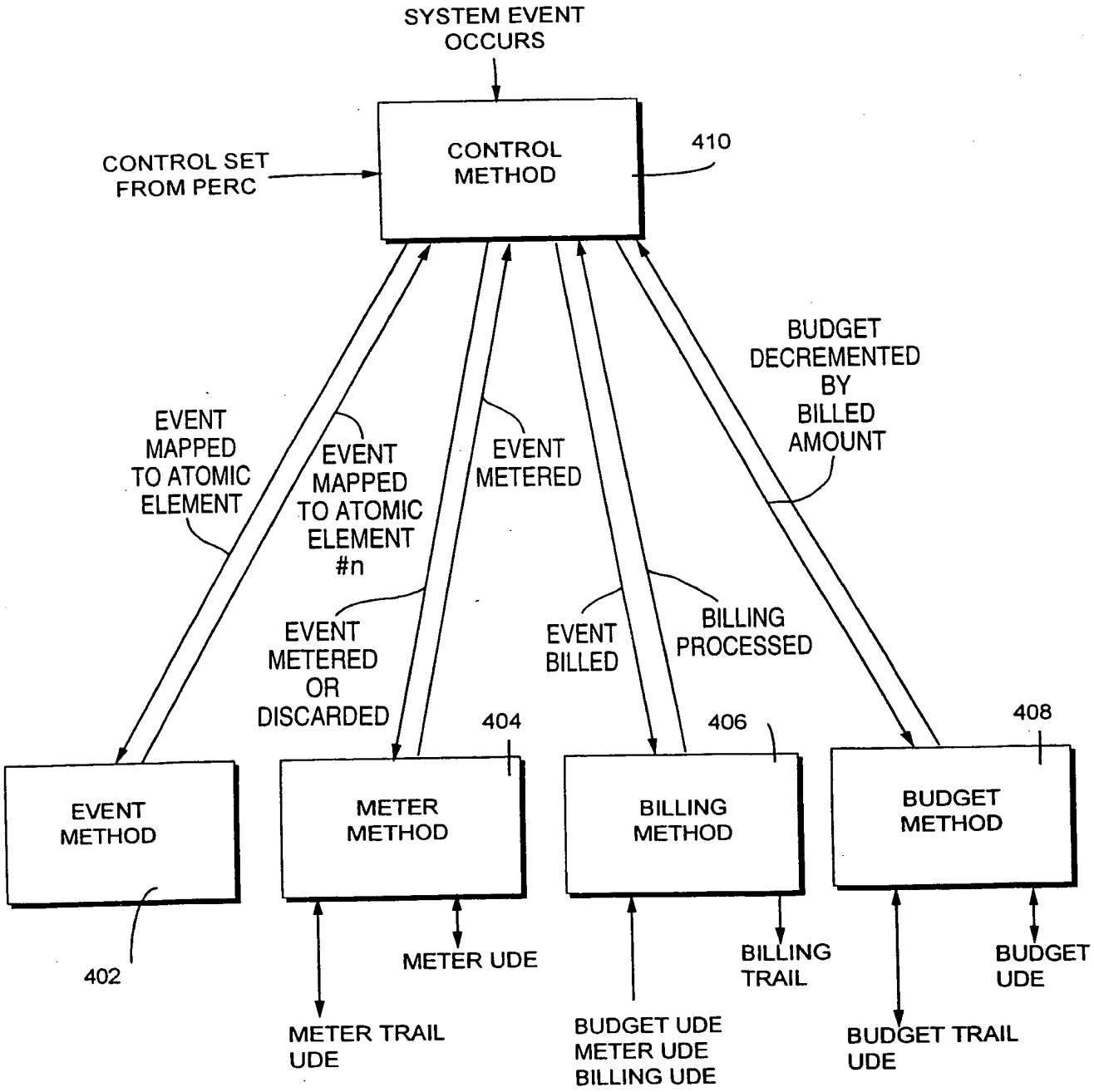

SYSTEM EVENT OCCURS
CONTROL METHOD
410
CONTROL SET FROM PERC
EVENT MAPPED TO ATOMIC ELEMENT
EVENT MAPPED TO ATOMIC ELEMENT #n
EVENT METERED
BUDGET DECREMENTED BY BILLED AMOUNT
EVENT METERED OR DISCARDED
EVENT BILLED
BILLING PROCESSED
EVENT METHOD
METER METHOD
BILLING METHOD
BUDGET METHOD
404
406
408
402
METER UDE
METER TRAIL UDE
BUDGET UDE METER UDE BILLING UDE
BILLING TRAIL
BUDGET TRAIL UDE
BUDGET UDE

FIG. 47

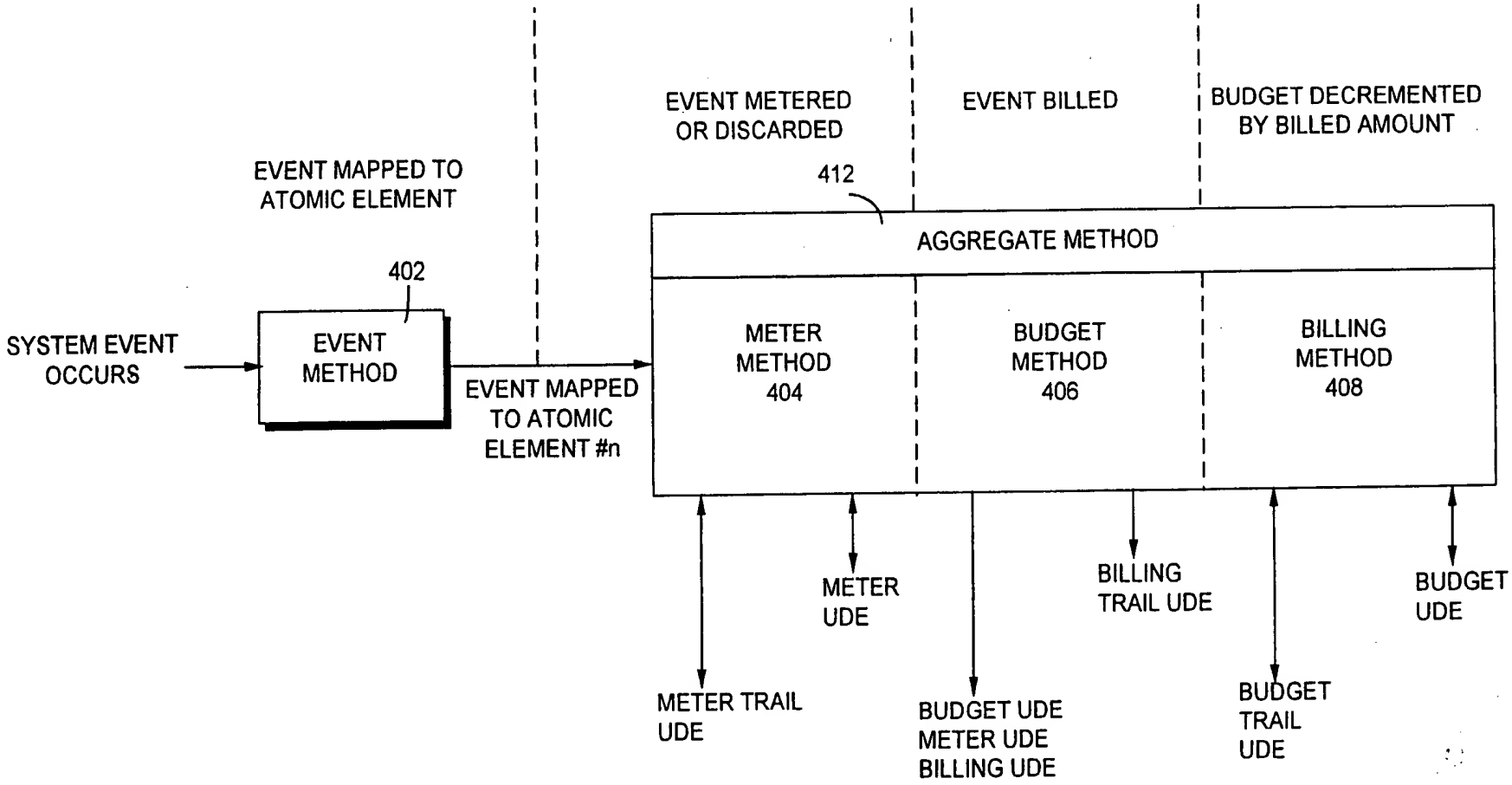
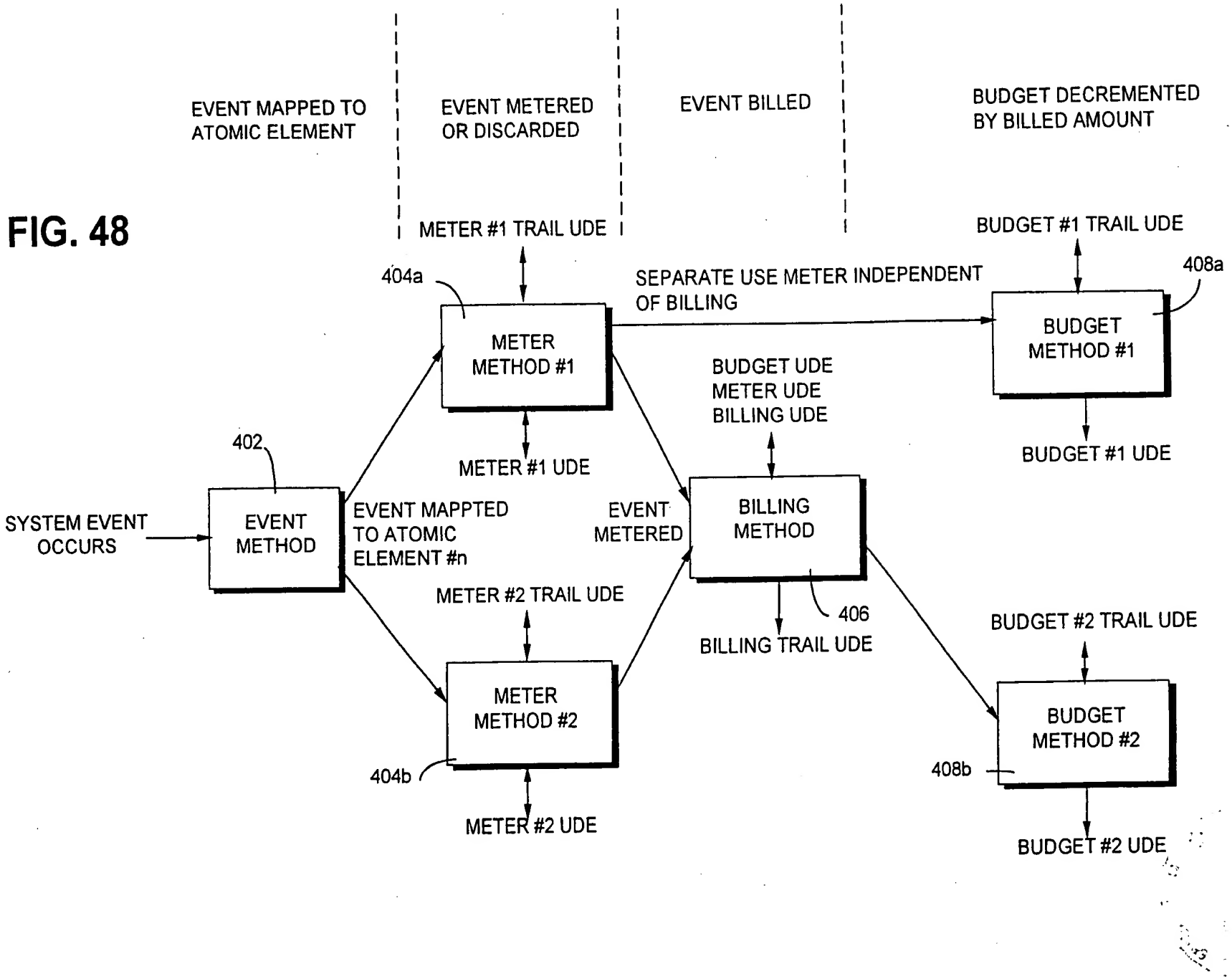

EVENT METERED OR DISCARDED
EVENT BILLED
BUDGET DECREMENTED BY BILLED AMOUNT
EVENT MAPPED TO ATOMIC ELEMENT
412
AGGREGATE METHOD
402
SYSTEM EVENT OCCURS
EVENT METHOD
EVENT MAPPED TO ATOMIC ELEMENT #n
METER METHOD 404
BUDGET METHOD 406
BILLING METHOD 408
METER UDE
BILLING TRAIL UDE
BUDGET UDE
METER TRAIL UDE
BUDGET UDE METER UDE BILLING UDE
BUDGET TRAIL UDE

FIG. 48


EVENT MAPPED TO ATOMIC ELEMENT
EVENT METERED OR DISCARDED
EVENT BILLED
BUDGET DECREMENTED BY BILLED AMOUNT
METER #1 TRAIL UDE
404a
METER METHOD #1
METER #1 UDE
SEPARATE USE METER INDEPENDENT OF BILLING
BUDGET #1 TRAIL UDE
408a
BUDGET METHOD #1
BUDGET #1 UDE
BUDGET UDE
METER UDE
BILLING UDE
402
SYSTEM EVENT OCCURS
EVENT METHOD
EVENT MAPPTED TO ATOMIC ELEMENT #n
EVENT METERED
BILLING METHOD
406
BILLING TRAIL UDE
METER #2 TRAIL UDE
METER METHOD #2
404b
METER #2 UDE
BUDGET #2 TRAIL UDE
BUDGET METHOD #2
408b
BUDGET #2 UDE

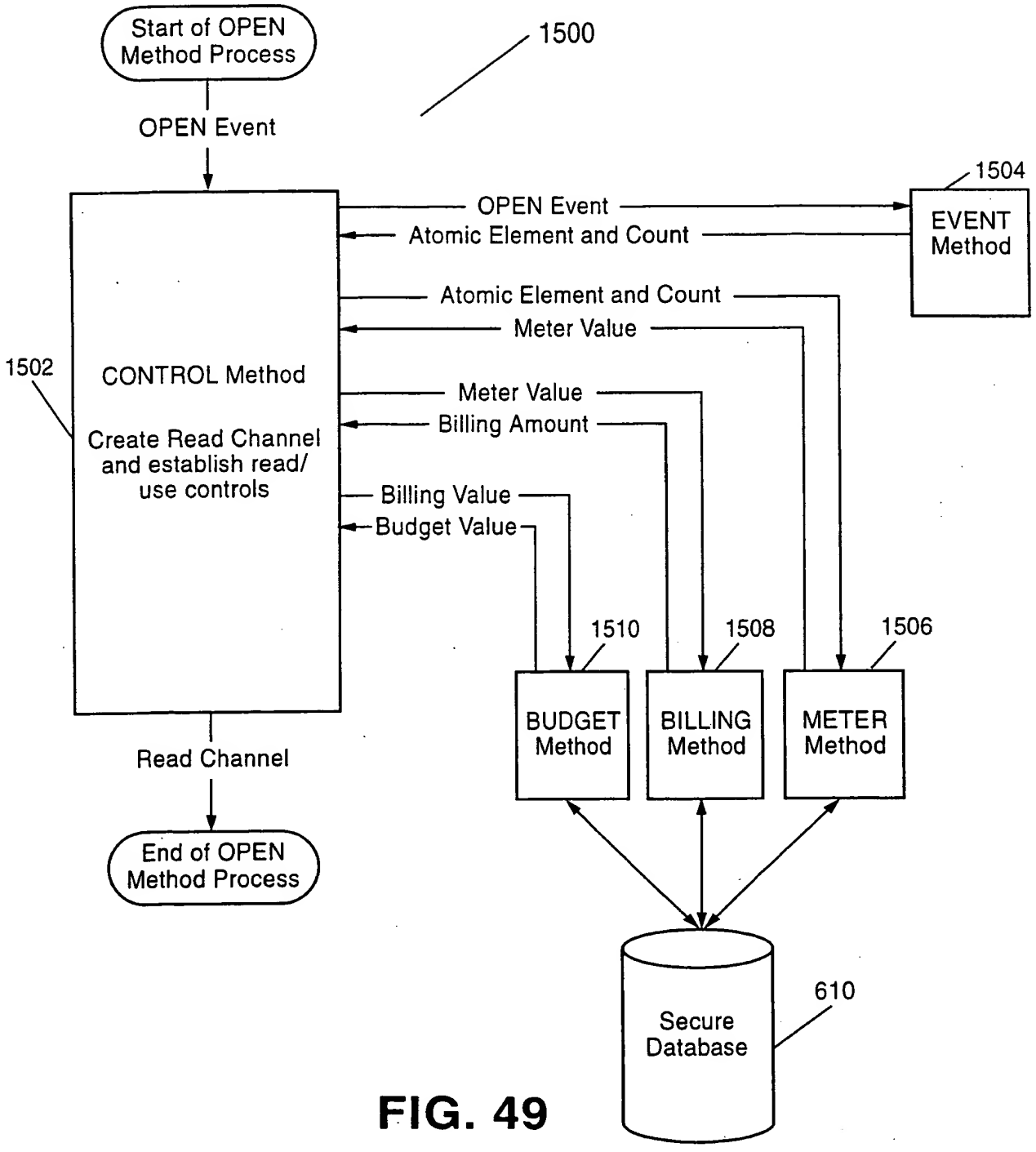

Start of OPEN Method Process
1500
OPEN Event
1504
OPEN Event
Atomic Element and Count
EVENT Method
Atomic Element and Count
Meter Value
1502
CONTROL Method
Create Read Channel and establish read/ use controls
Meter Value
Billing Amount
Billing Value
Budget Value
1510
1508
1506
BUDGET Method
BILLING Method
METER Method
Read Channel
End of OPEN Method Process
610
Secure Database

FIG. 49

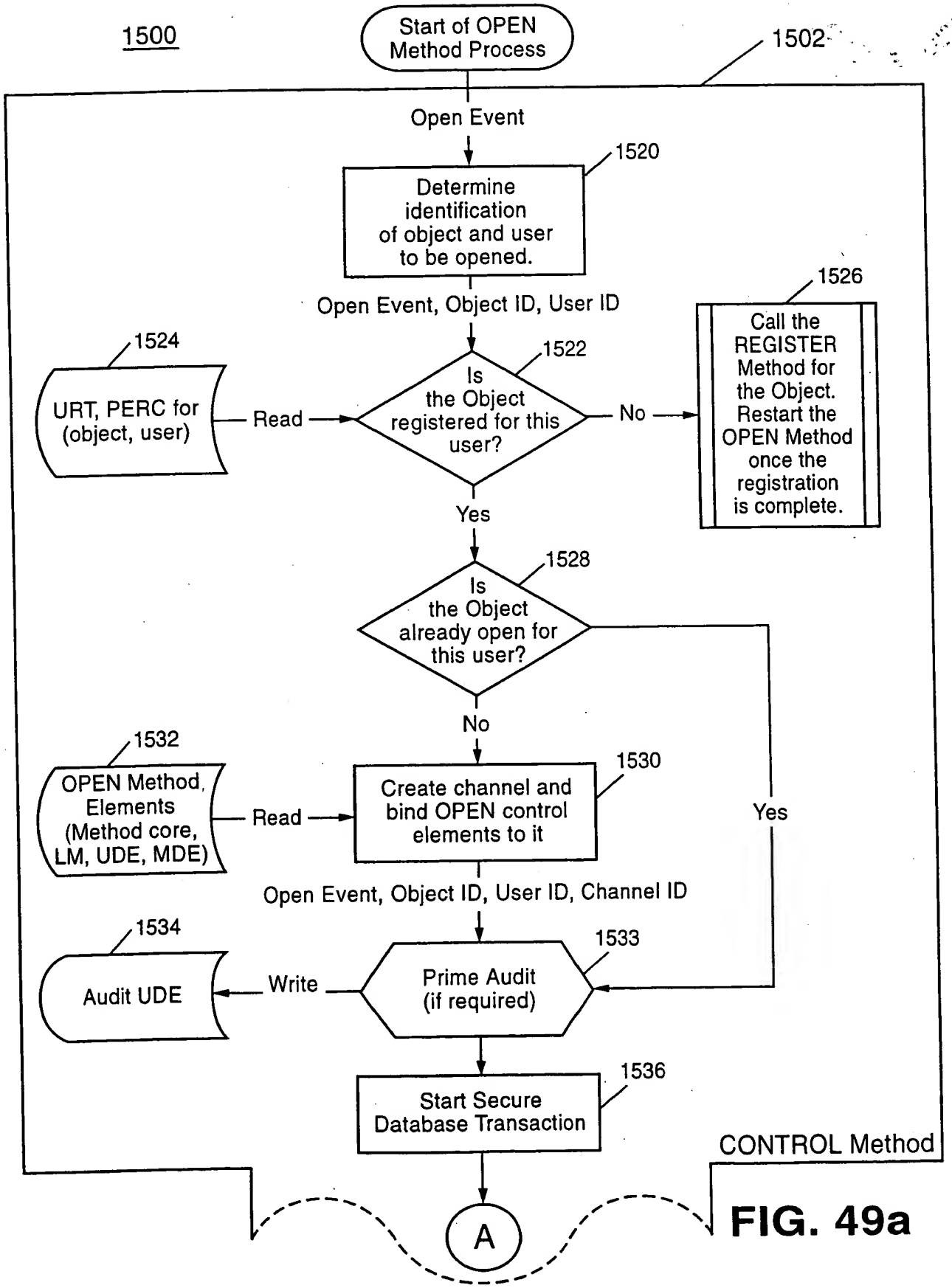

1500
Start of OPEN Method Process
1502
Open Event
1520
Determine identification of object and user to be opened.
Open Event, Object ID, User ID
1526
Call the REGISTER Method for the Object. Restart the OPEN Method once the registration is complete.
1524
URT, PERC for (object, user)
Read
1522
Is the Object registered for this user?
No
Yes
1528
Is the Object already open for this user?
Yes
No
1532
OPEN Method, Elements (Method core, LM, UDE, MDE)
Read
1530
Create channel and bind OPEN control elements to it
Open Event, Object ID, User ID, Channel ID
1534
Audit UDE
Write
1533
Prime Audit (if required)
1536
Start Secure Database Transaction
CONTROL Method
A

FIG. 49a

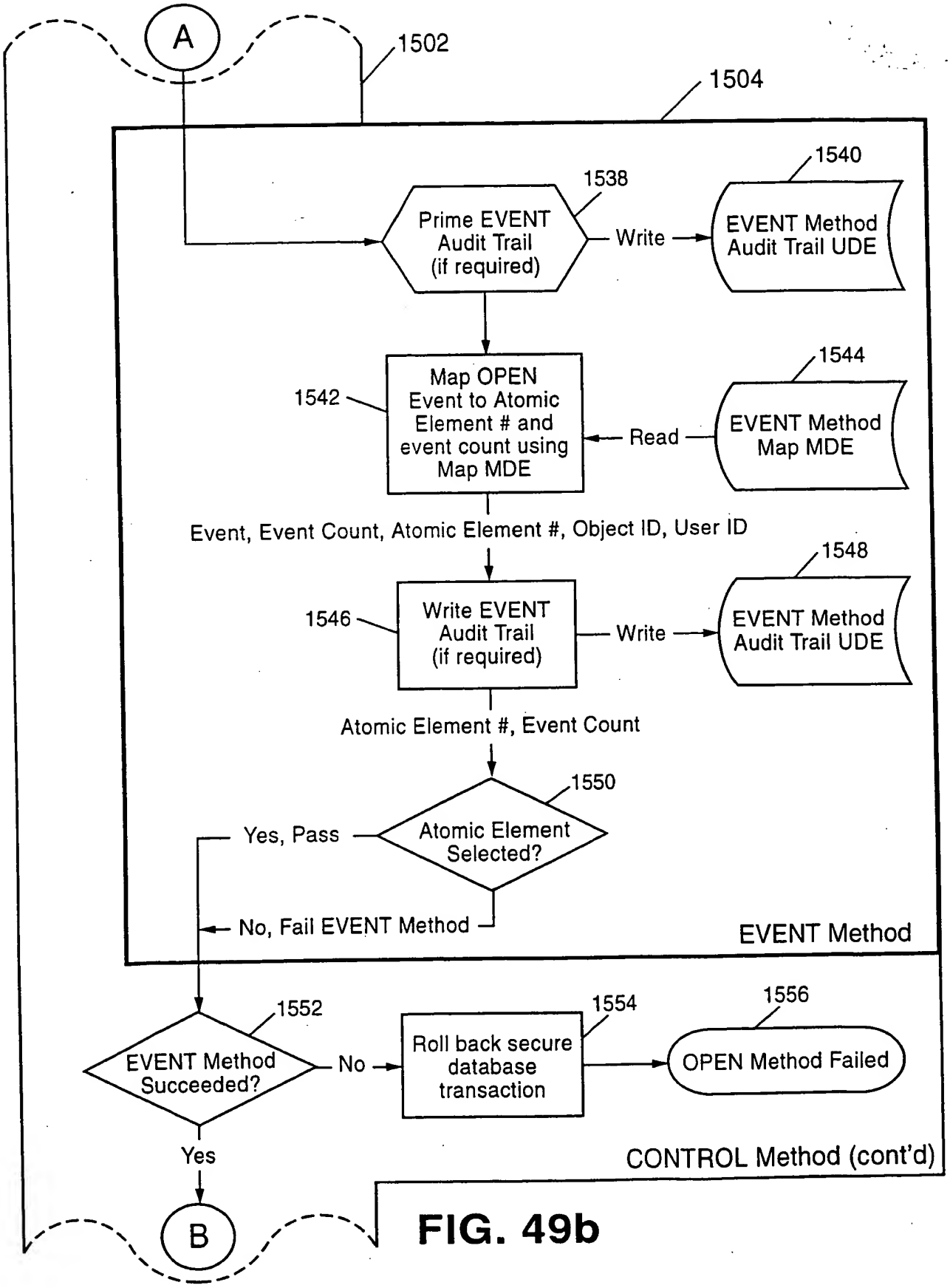

A
1502
1504
1538
Prime EVENT Audit Trail (if required)
Write
1540
EVENT Method Audit Trail UDE
1542
Map OPEN Event to Atomic Element # and event count using Map MDE
Read
1544
EVENT Method Map MDE
Event, Event Count, Atomic Element #, Object ID, User ID
1546
Write EVENT Audit Trail (if required)
Write
1548
EVENT Method Audit Trail UDE
Atomic Element #, Event Count
1550
Atomic Element Selected?
Yes, Pass
No, Fail EVENT Method
EVENT Method
1552
EVENT Method Succeeded?
No
1554
Roll back secure database transaction
1556
OPEN Method Failed
Yes
CONTROL Method (cont'd)
B

FIG. 49b

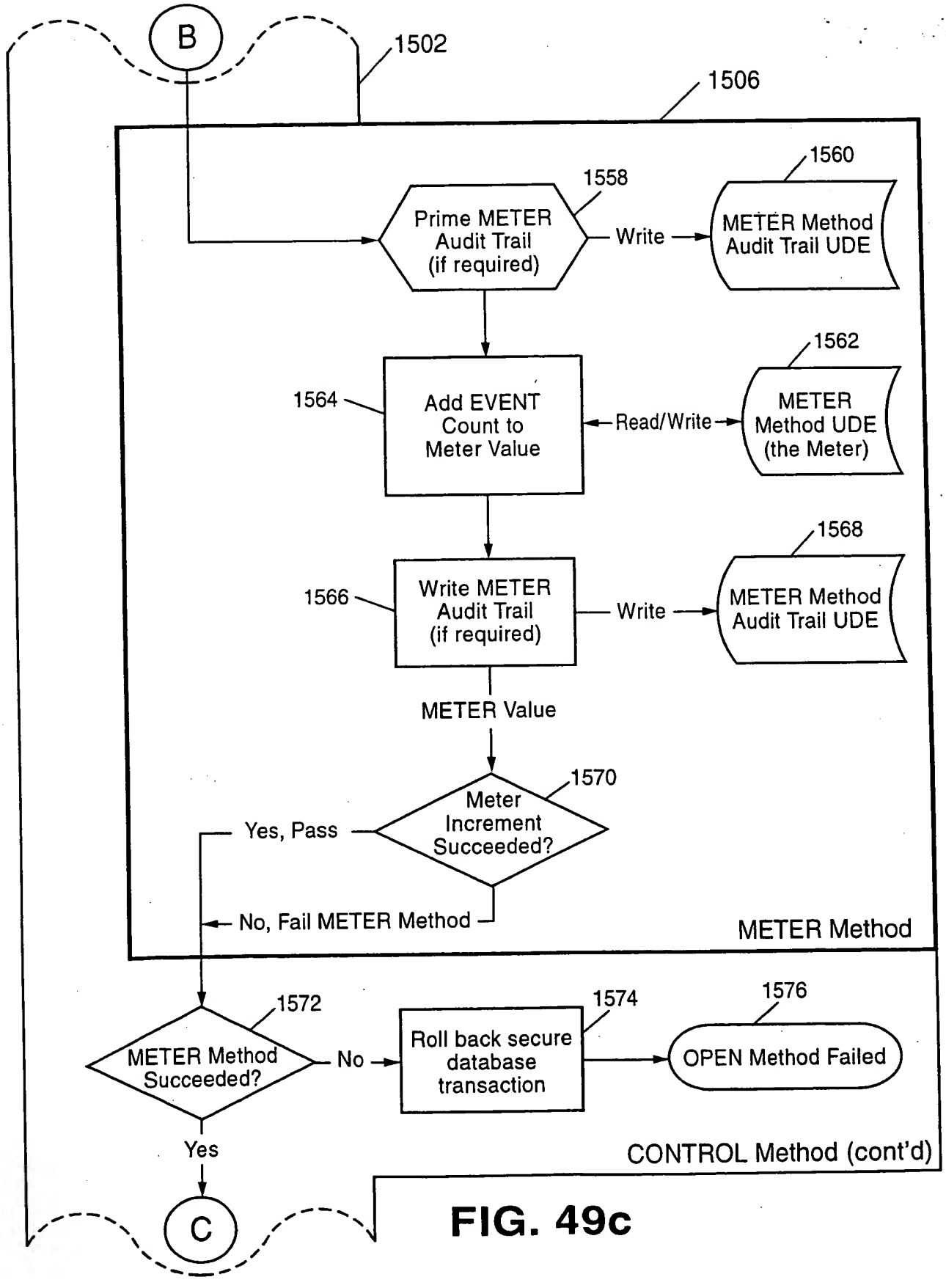

B
1502
1506
1558
Prime METER Audit Trail (if required)
Write
1560
METER Method Audit Trail UDE
1562
1564
Add EVENT Count to Meter Value
Read/Write
METER Method UDE (the Meter)
1568
1566
Write METER Audit Trail (if required)
Write
METER Method Audit Trail UDE
METER Value
1570
Meter Increment Succeeded?
Yes, Pass
No, Fail METER Method
METER Method
1572
METER Method Succeeded?
No
1574
Roll back secure database transaction
1576
OPEN Method Failed
Yes
CONTROL Method (cont'd)
C

FIG. 49c

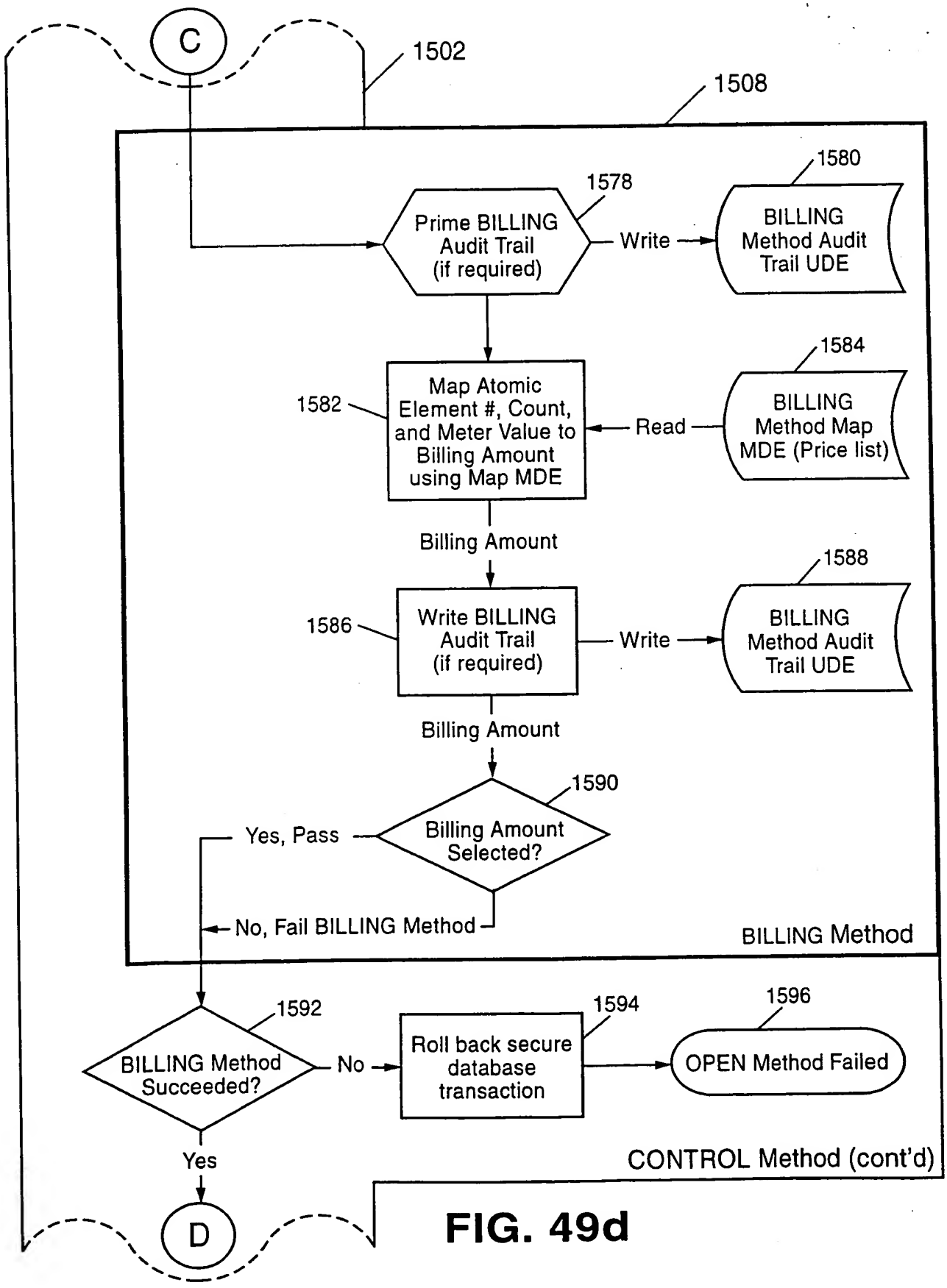

C
1502
1508
1578
Prime BILLING Audit Trail (if required)
Write
1580
BILLING Method Audit Trail UDE
1584
1582
Map Atomic Element #, Count, and Meter Value to Billing Amount using Map MDE
Read
BILLING Method Map MDE (Price list)
Billing Amount
1588
1586
Write BILLING Audit Trail (if required)
Write
BILLING Method Audit Trail UDE
Billing Amount
1590
Yes, Pass
Billing Amount Selected?
No, Fail BILLING Method
BILLING Method
1592
BILLING Method Succeeded?
No
1594
Roll back secure database transaction
1596
OPEN Method Failed
Yes
CONTROL Method (cont'd)
D

FIG. 49d

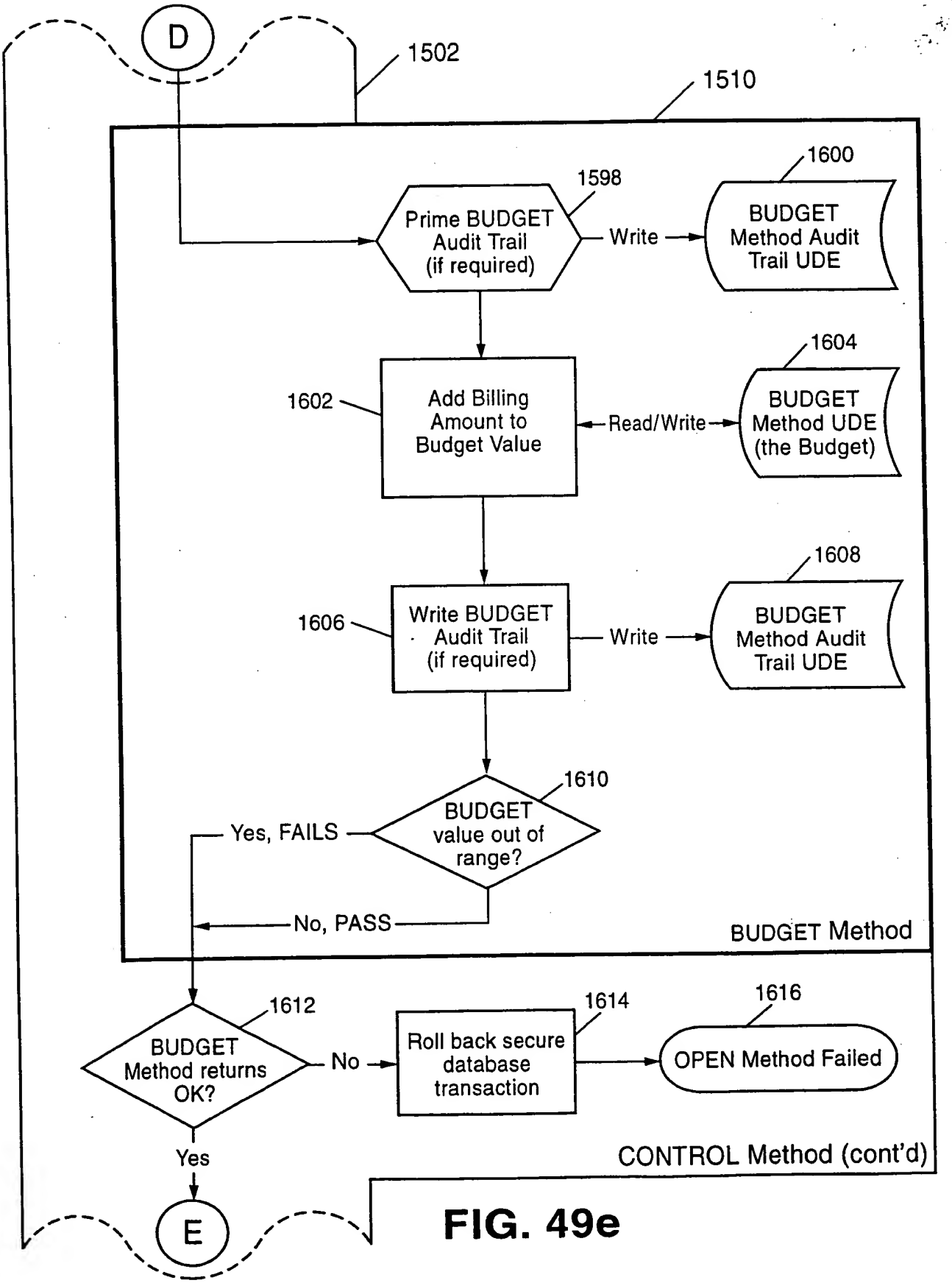

D
1502
1510
1598
Prime BUDGET Audit Trail (if required)
Write
1600
BUDGET Method Audit Trail UDE
1602
Add Billing Amount to Budget Value
Read/Write
1604
BUDGET Method UDE (the Budget)
1606
Write BUDGET Audit Trail (if required)
Write
1608
BUDGET Method Audit Trail UDE
1610
BUDGET value out of range?
Yes, FAILS
No, PASS
BUDGET Method
1612
BUDGET Method returns OK?
No
1614
Roll back secure database transaction
1616
OPEN Method Failed
Yes
CONTROL Method (cont'd)
E

FIG. 49e

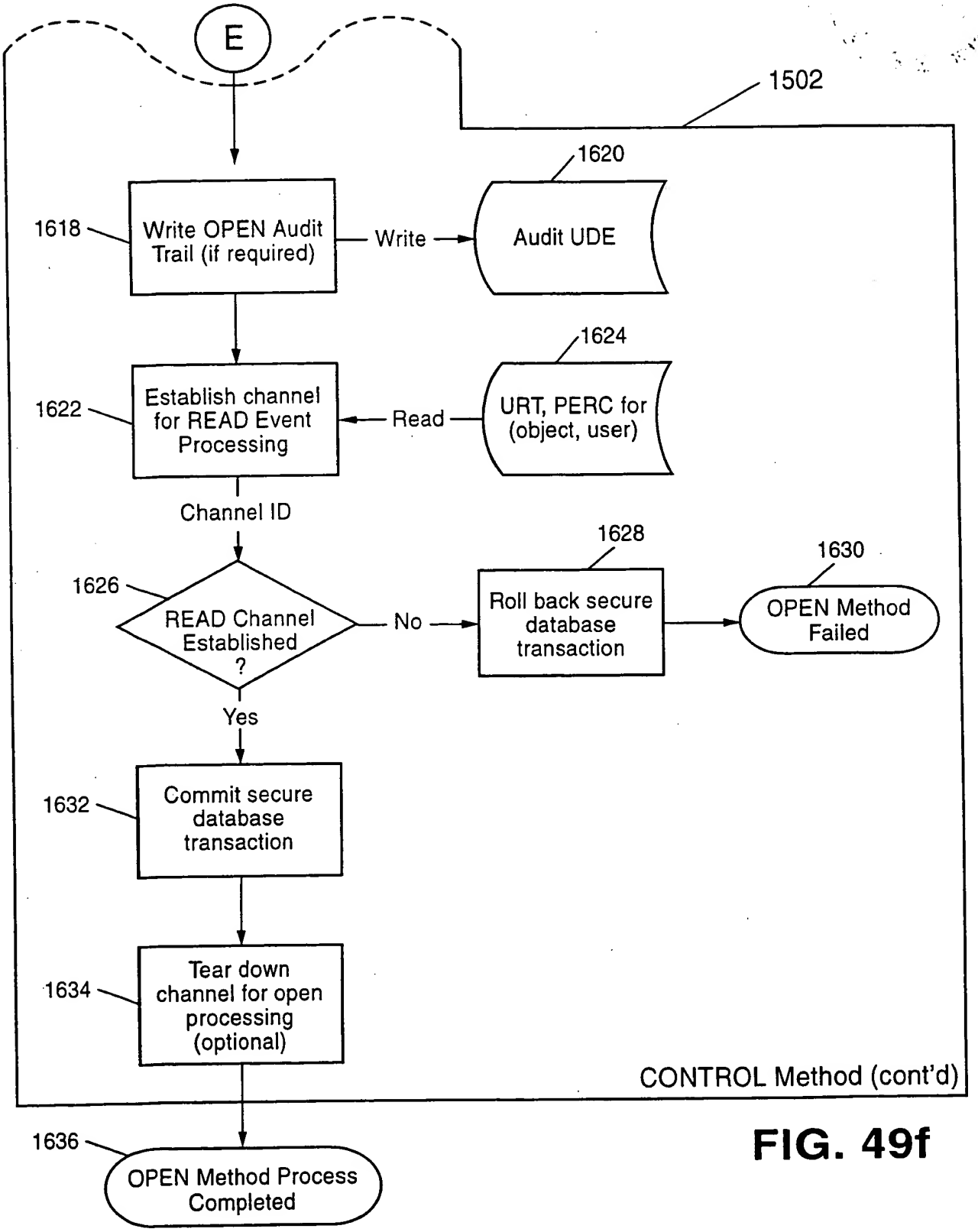

E
1502
1620
1618
Write OPEN Audit Trail (if required)
Write
Audit UDE
1624
1622
Establish channel for READ Event Processing
Read
URT, PERC for (object, user)
Channel ID
1628
1630
1626
READ Channel Established ?
No
Roll back secure database transaction
OPEN Method Failed
Yes
1632
Commit secure database transaction
1634
Tear down channel for open processing (optional)
CONTROL Method (cont'd)
1636
OPEN Method Process Completed

FIG. 49f

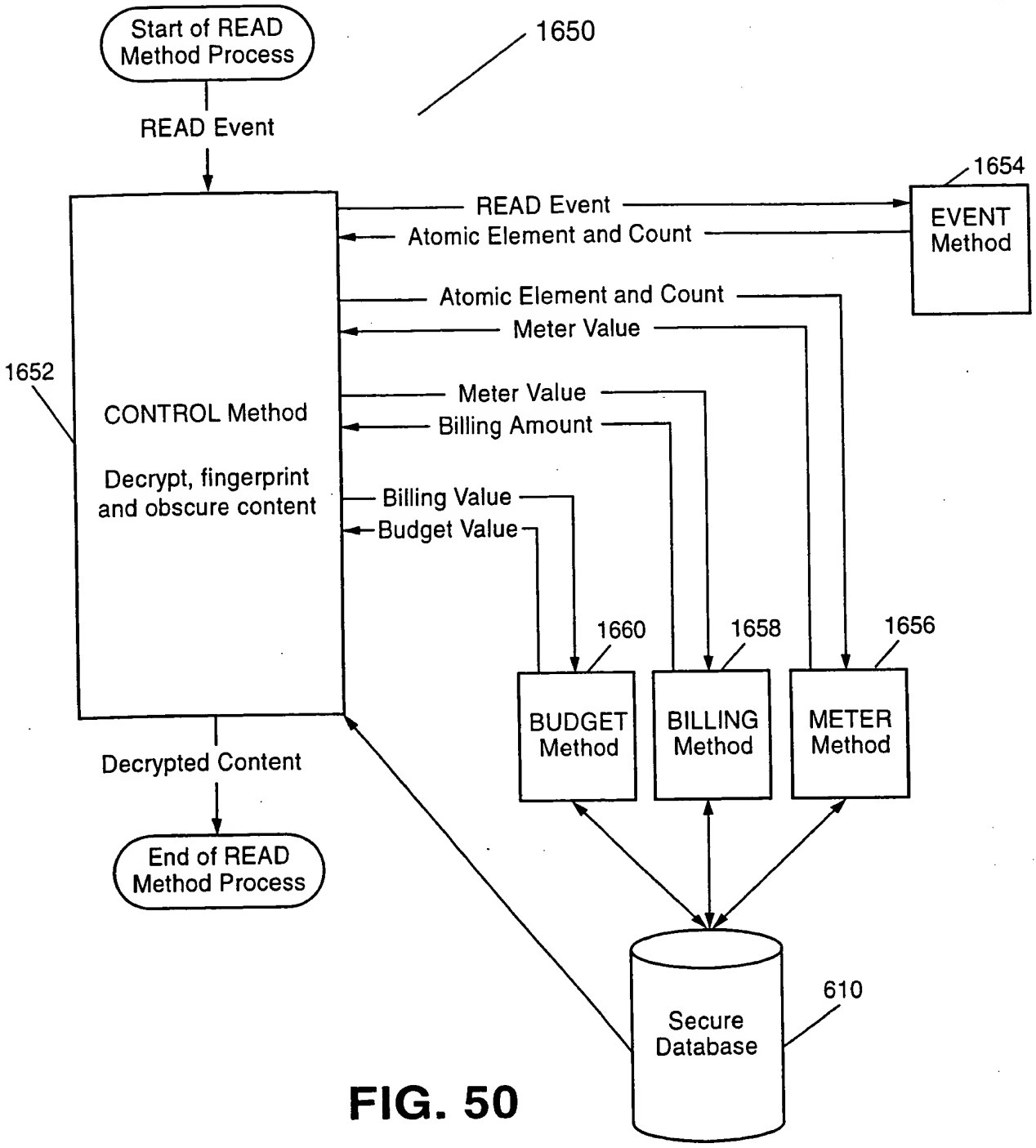

Start of READ Method Process
1650
READ Event
1654
READ Event
Atomic Element and Count
EVENT Method
Atomic Element and Count
Meter Value
1652
CONTROL Method
Decrypt, fingerprint and obscure content
Meter Value
Billing Amount
Billing Value
Budget Value
1660
1658
1656
BUDGET Method
BILLING Method
METER Method
Decrypted Content
End of READ Method Process
610
Secure Database

FIG. 50

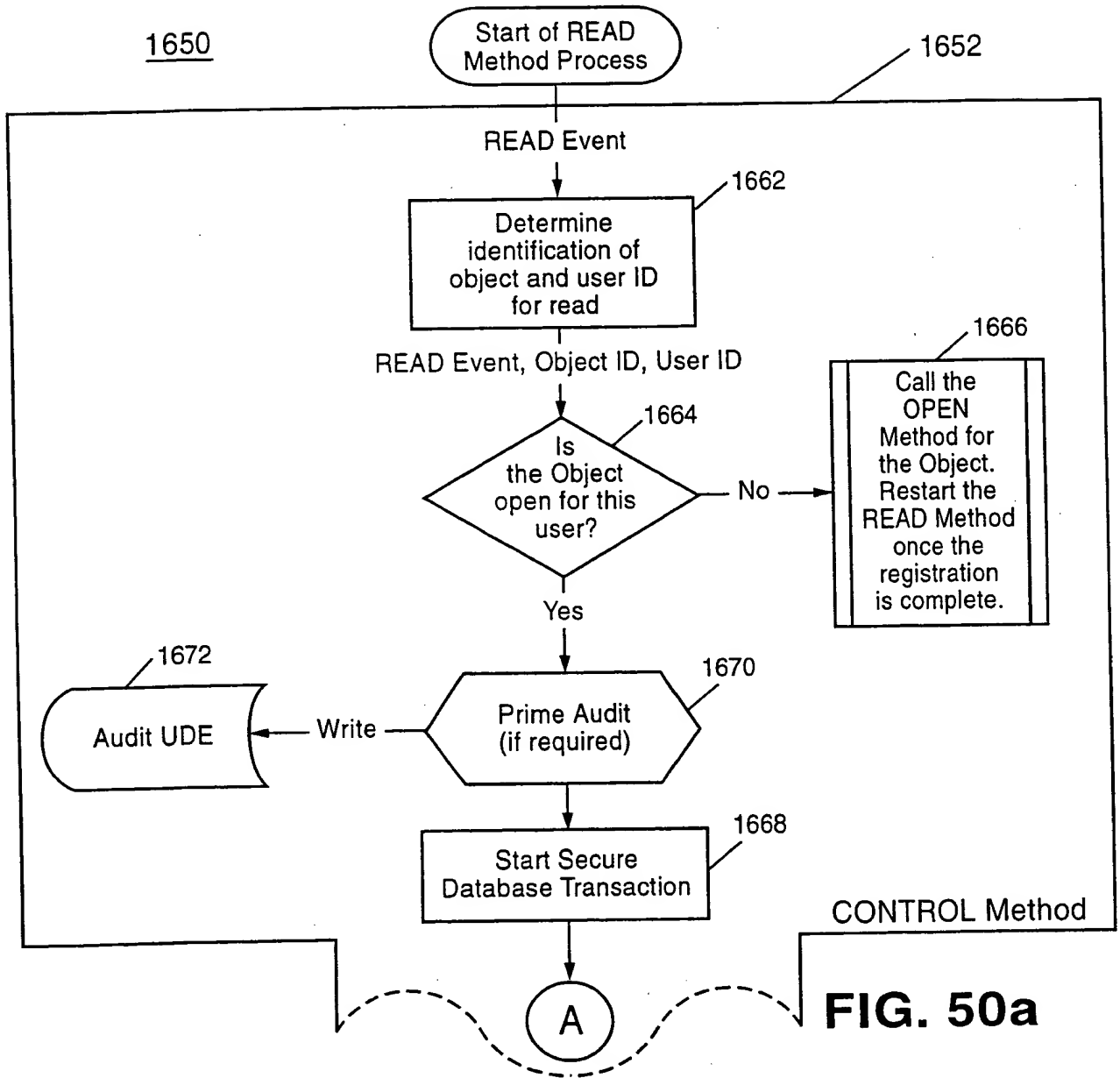

1650
Start of READ Method Process
1652
READ Event
1662
Determine identification of object and user ID for read
READ Event, Object ID, User ID
1666
Call the OPEN Method for the Object. Restart the READ Method once the registration is complete.
1664
Is the Object open for this user?
No
Yes
1672
Audit UDE
Write
1670
Prime Audit (if required)
1668
Start Secure Database Transaction
CONTROL Method
A

FIG. 50a

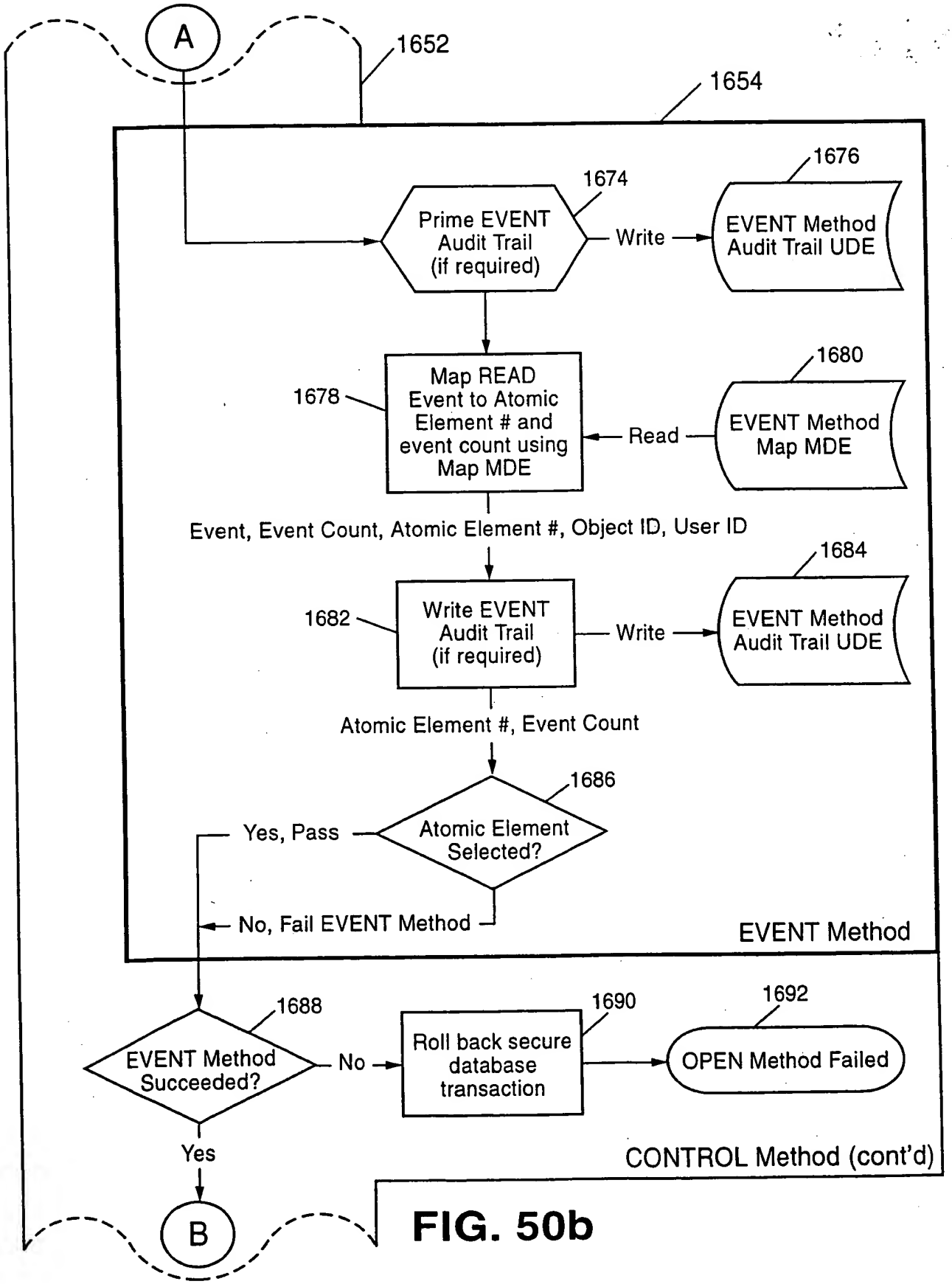

A
1652
1654
1676
1674
Prime EVENT Audit Trail (if required)
Write
EVENT Method Audit Trail UDE
1680
1678
Map READ Event to Atomic Element # and event count using Map MDE
Read
EVENT Method Map MDE
Event, Event Count, Atomic Element #, Object ID, User ID
1684
1682
Write EVENT Audit Trail (if required)
Write
EVENT Method Audit Trail UDE
Atomic Element #, Event Count
1686
Yes, Pass
Atomic Element Selected?
No, Fail EVENT Method
EVENT Method
1688
1690
1692
EVENT Method Succeeded?
No
Roll back secure database transaction
OPEN Method Failed
Yes
CONTROL Method (cont'd)
B

FIG. 50b

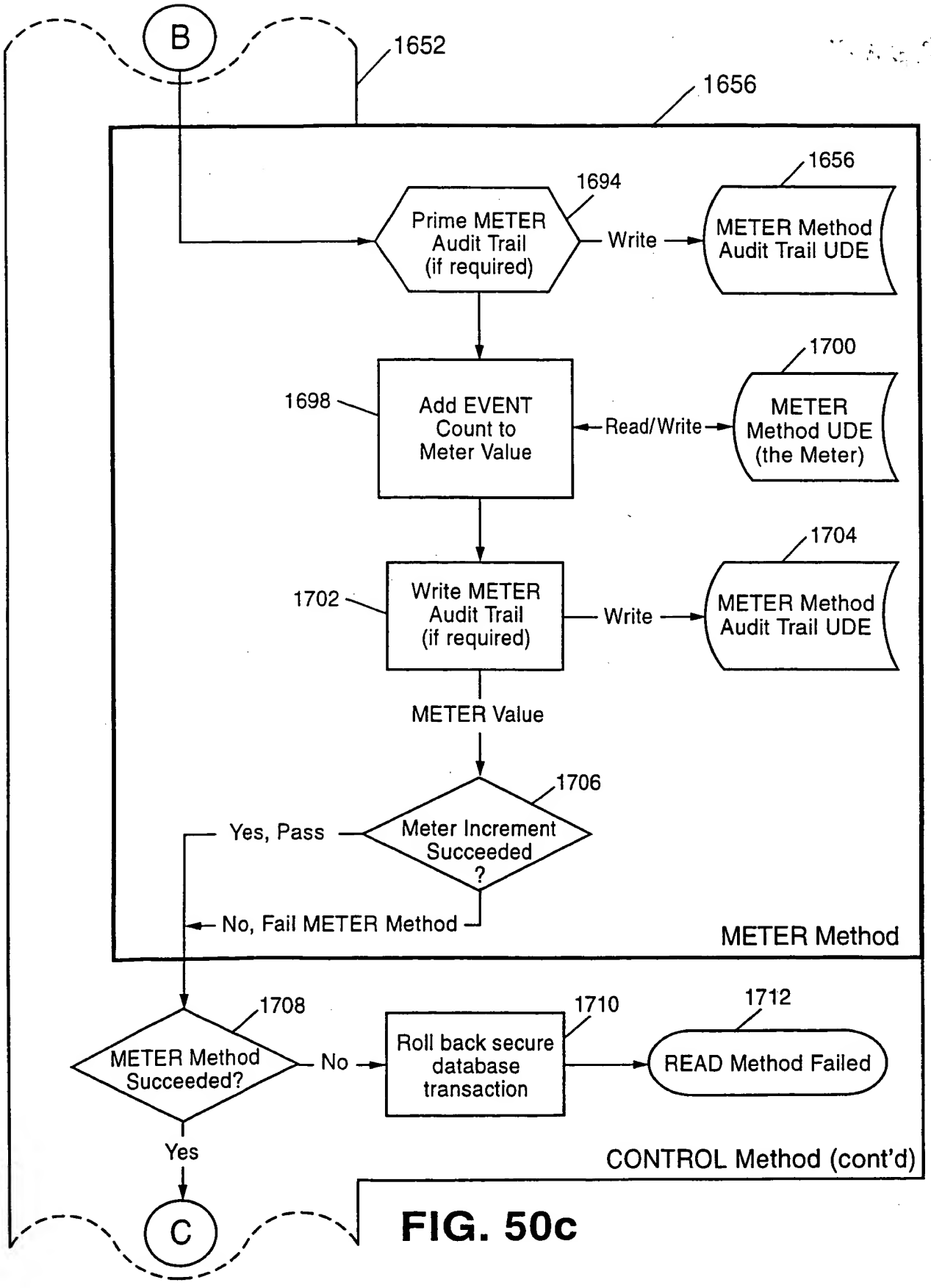

B
1652
1656
1694
Prime METER Audit Trail (if required)
Write
1656
METER Method Audit Trail UDE
1700
1698
Add EVENT Count to Meter Value
Read/Write
METER Method UDE (the Meter)
1704
1702
Write METER Audit Trail (if required)
Write
METER Method Audit Trail UDE
METER Value
1706
Yes, Pass
Meter Increment Succeeded ?
No, Fail METER Method
METER Method
1708
METER Method Succeeded?
No
1710
Roll back secure database transaction
1712
READ Method Failed
Yes
CONTROL Method (cont'd)
C

FIG. 50c

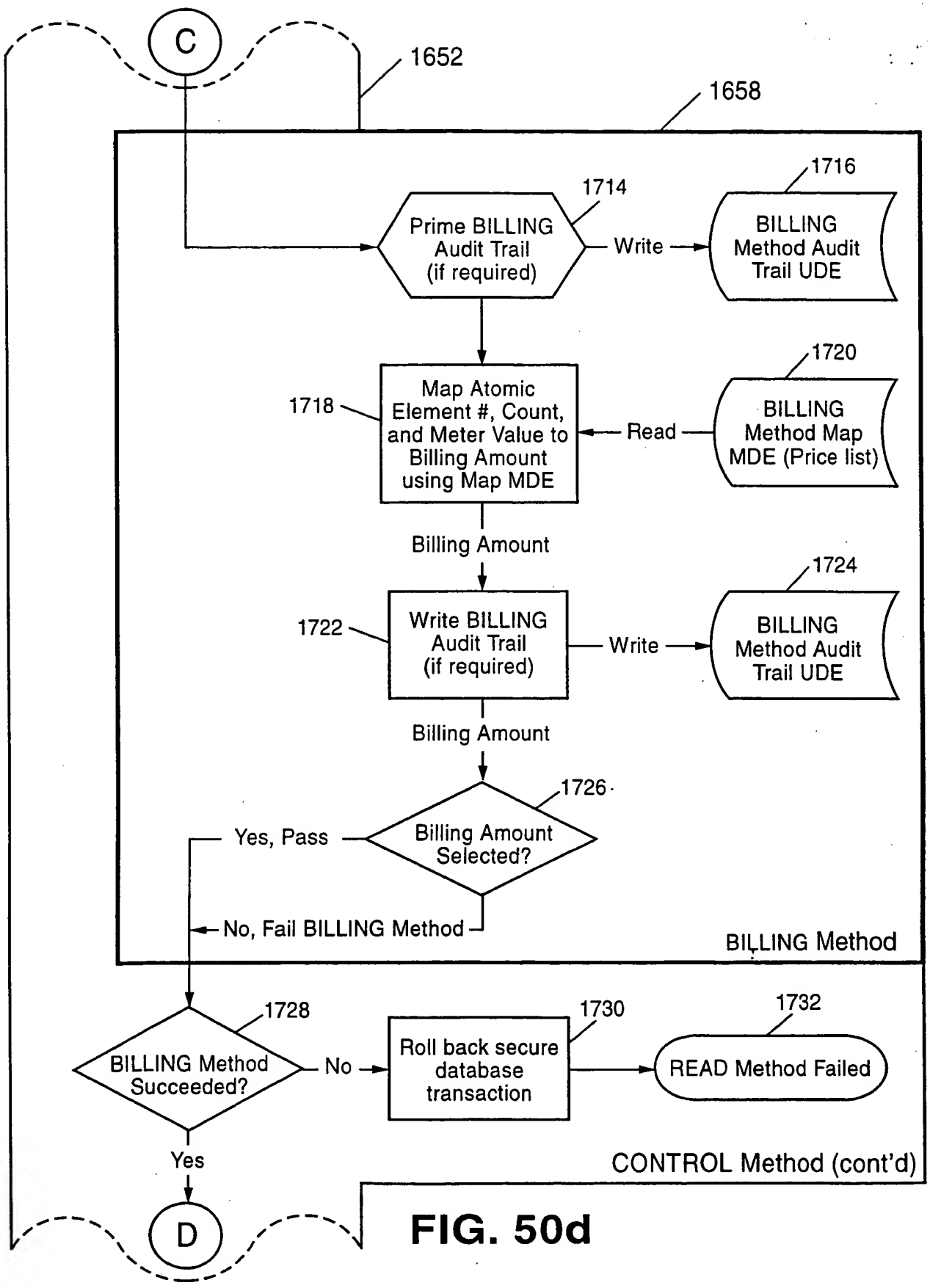

C
1652
1658
1714
Prime BILLING Audit Trail (if required)
Write
1716
BILLING Method Audit Trail UDE
1718
Map Atomic Element #, Count, and Meter Value to Billing Amount using Map MDE
Read
1720
BILLING Method Map MDE (Price list)
Billing Amount
1722
Write BILLING Audit Trail (if required)
Write
1724
BILLING Method Audit Trail UDE
Billing Amount
1726
Billing Amount Selected?
Yes, Pass
No, Fail BILLING Method
BILLING Method
1728
BILLING Method Succeeded?
No
1730
Roll back secure database transaction
1732
READ Method Failed
Yes
CONTROL Method (cont'd)
D

FIG. 50d

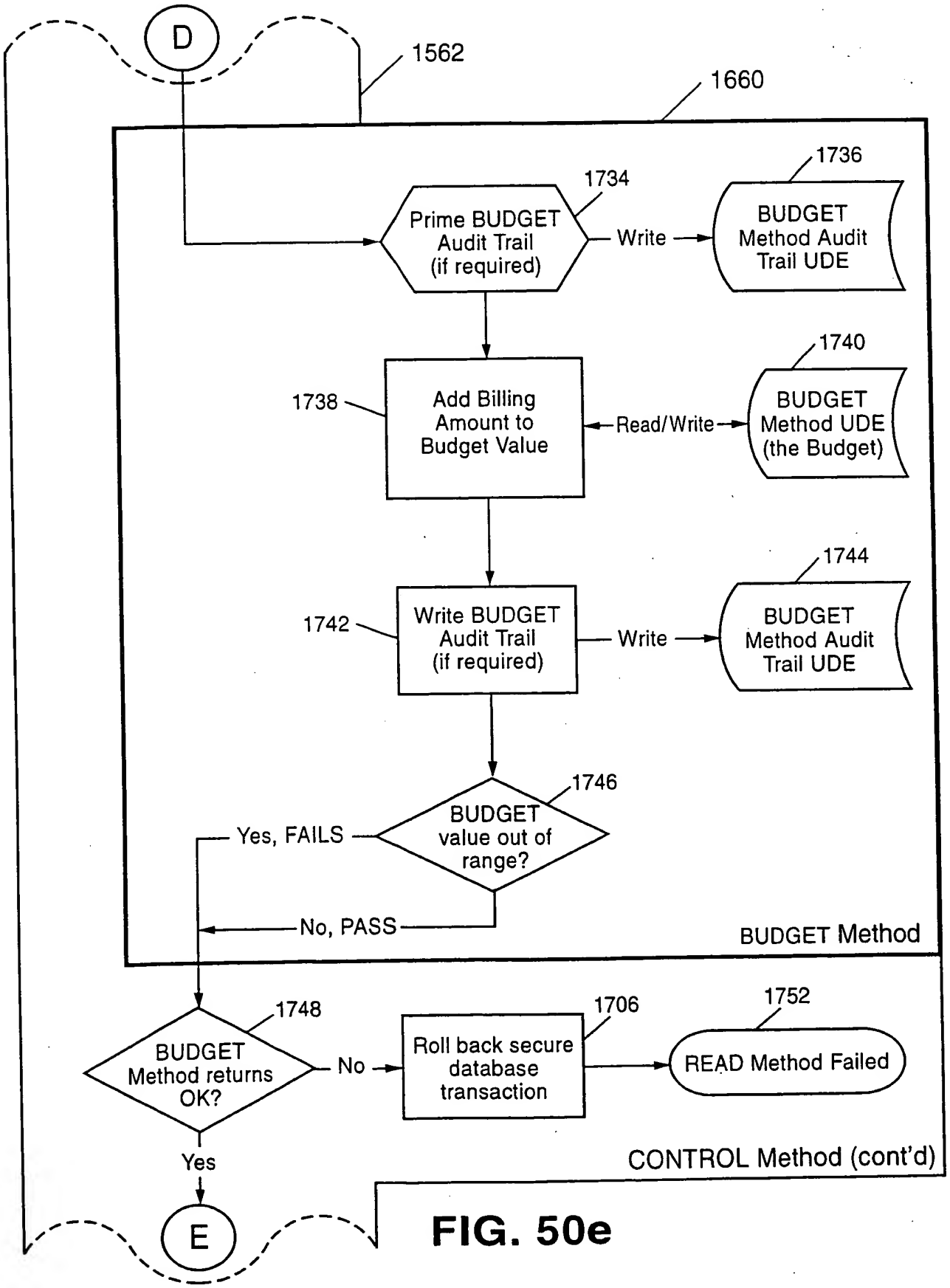
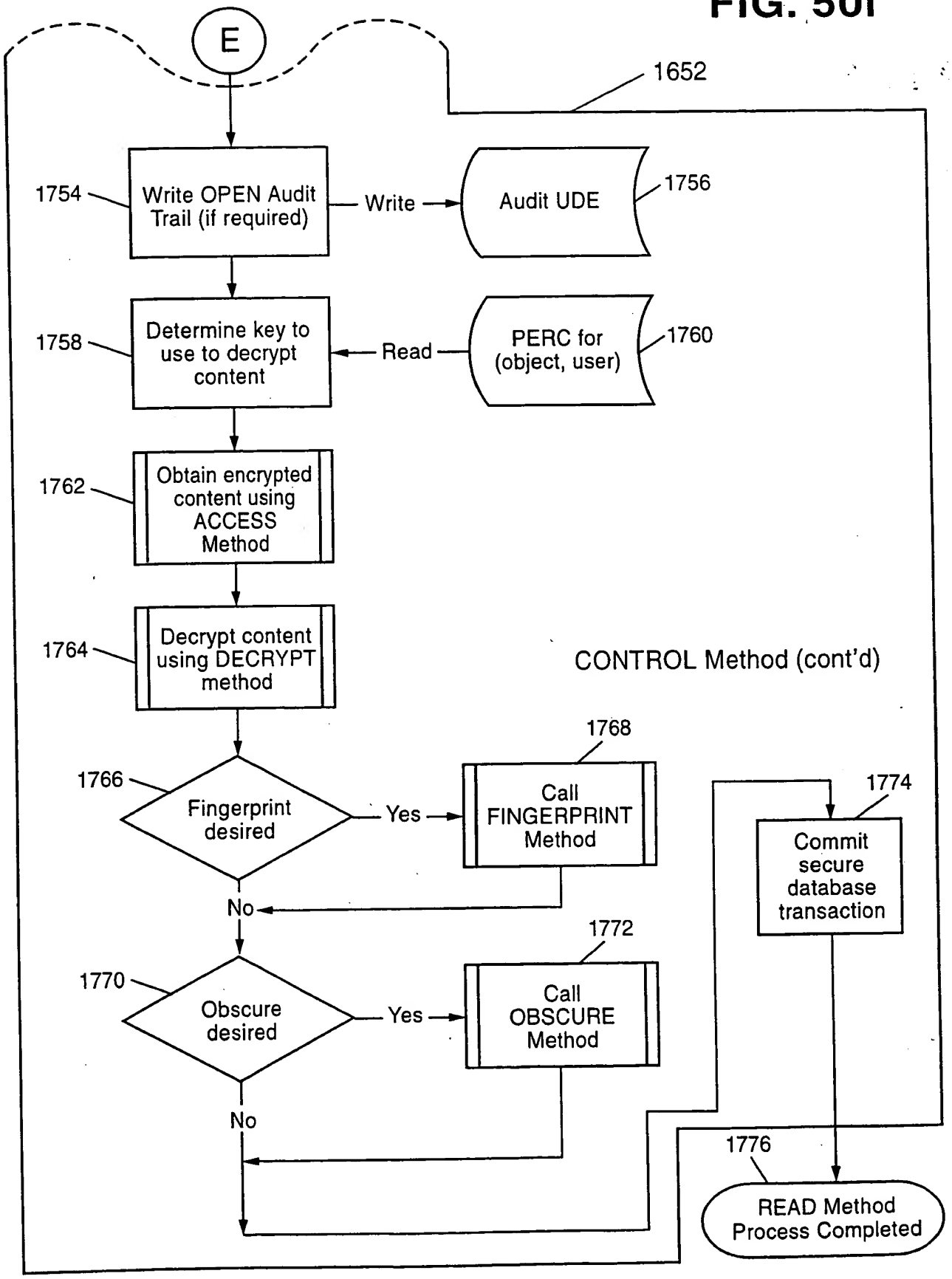

D
1562
1660
1734
Prime BUDGET Audit Trail (if required)
Write
1736
BUDGET Method Audit Trail UDE
1738
Add Billing Amount to Budget Value
Read/Write
1740
BUDGET Method UDE (the Budget)
1742
Write BUDGET Audit Trail (if required)
Write
1744
BUDGET Method Audit Trail UDE
1746
BUDGET value out of range?
Yes, FAILS
No, PASS
BUDGET Method
1748
BUDGET Method returns OK?
No
1706
Roll back secure database transaction
1752
READ Method Failed
Yes
CONTROL Method (cont'd)
E

FIG. 50e

FIG. 50f


E
1652
1754
Write OPEN Audit Trail (if required)
Write
Audit UDE
1756
1758
Determine key to use to decrypt content
Read
PERC for (object, user)
1760
1762
Obtain encrypted content using ACCESS Method
1764
Decrypt content using DECRYPT method
CONTROL Method (cont'd)
1768
1766
Fingerprint desired
Yes
Call FINGERPRINT Method
1774
Commit secure database transaction
No
1772
1770
Obscure desired
Yes
Call OBSCURE Method
No
1776
READ Method Process Completed

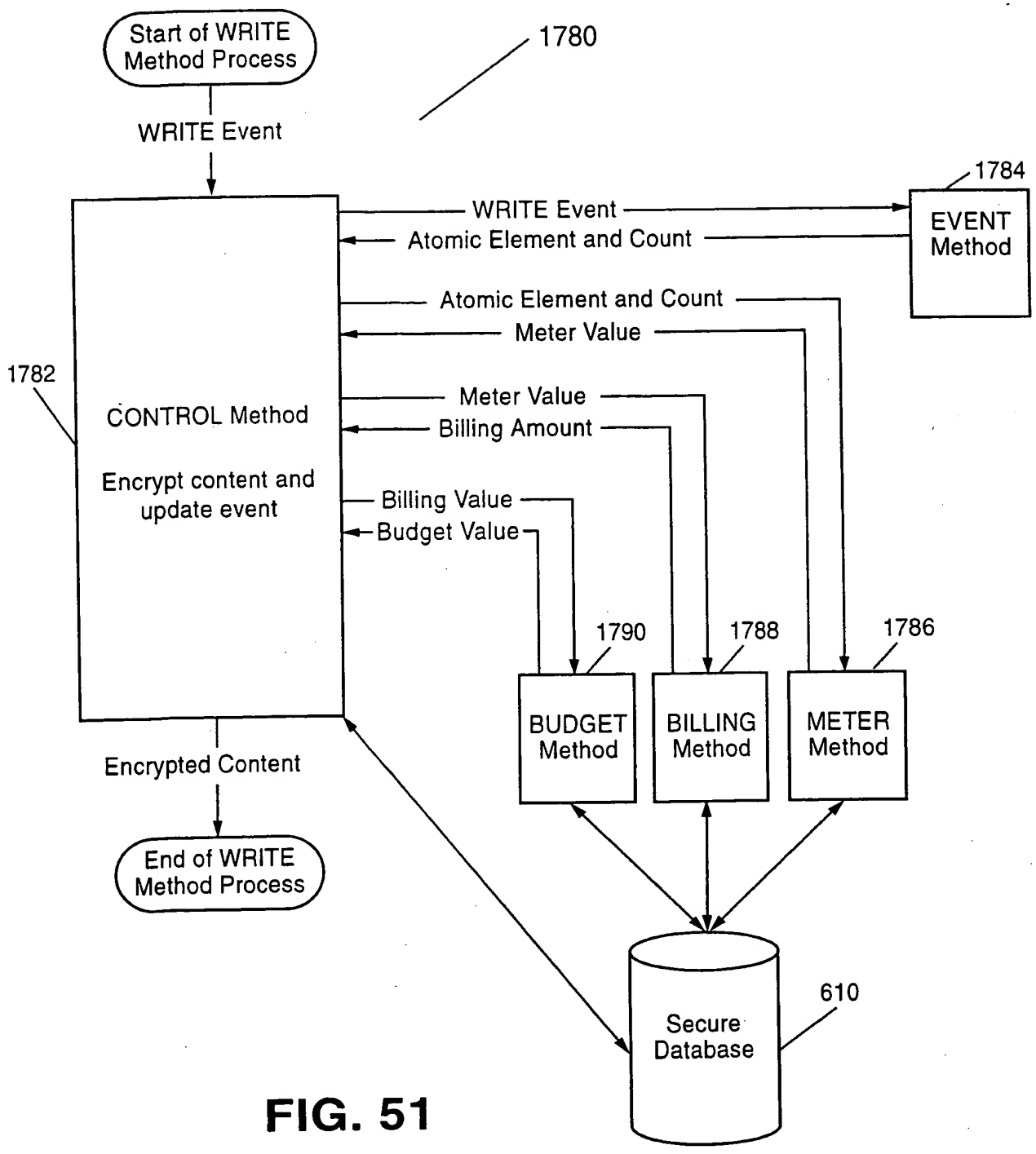

Start of WRITE Method Process
1780
WRITE Event
1784
WRITE Event
Atomic Element and Count
EVENT Method
Atomic Element and Count
Meter Value
1782
CONTROL Method
Encrypt content and update event
Meter Value
Billing Amount
Billing Value
Budget Value
1790
1788
1786
BUDGET Method
BILLING Method
METER Method
Encrypted Content
End of WRITE Method Process
610
Secure Database

FIG. 51

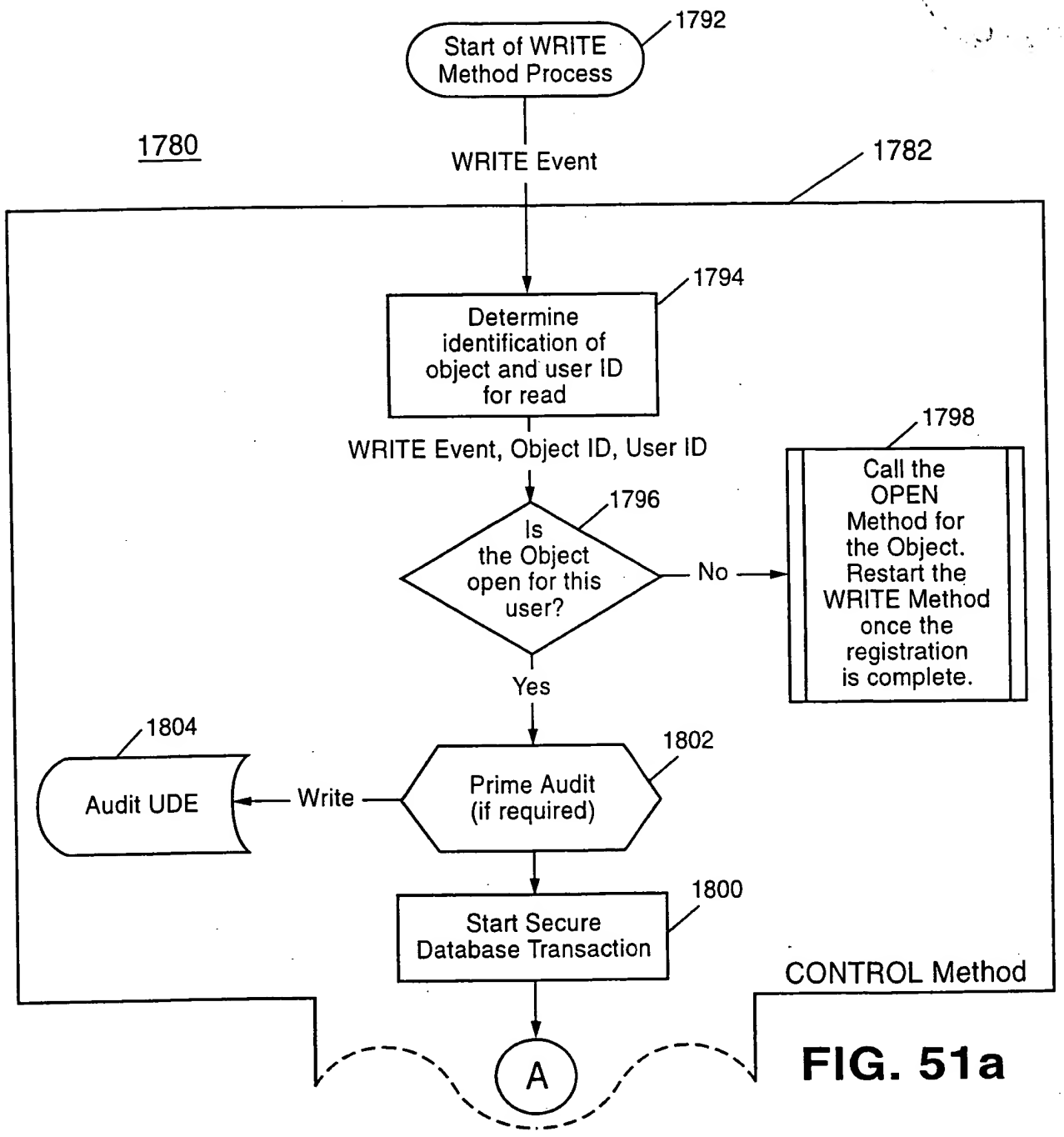

1780
1782
Start of WRITE Method Process
1792
WRITE Event
Determine identification of object and user ID for read
1794
WRITE Event, Object ID, User ID
Is the Object open for this user?
1796
No
Call the OPEN Method for the Object. Restart the WRITE Method once the registration is complete.
1798
Yes
Prime Audit (if required)
1802
Write
Audit UDE
1804
Start Secure Database Transaction
1800
CONTROL Method
A

FIG. 51a

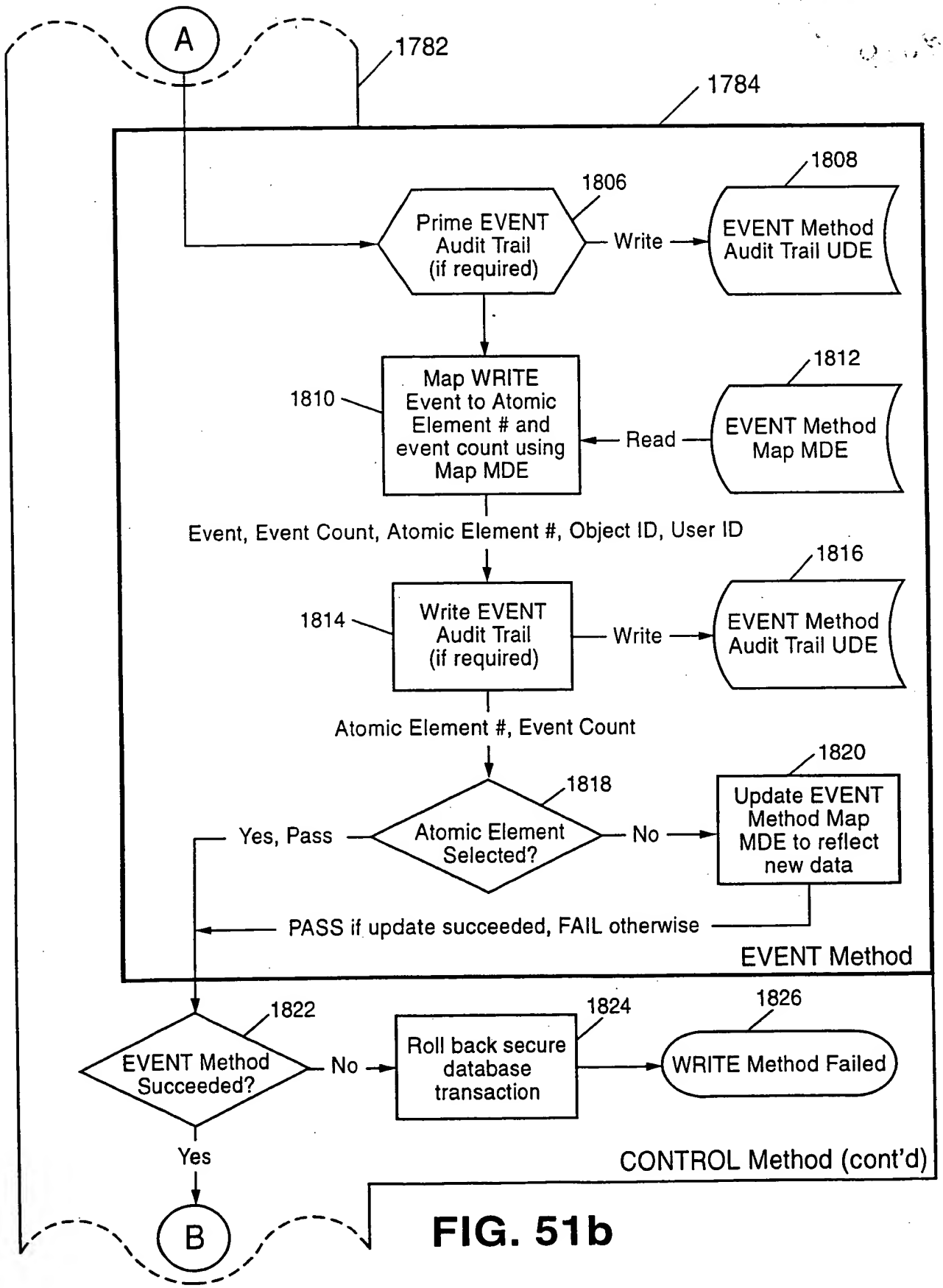

A
1782
1784
1806
Prime EVENT Audit Trail (if required)
Write
1808
EVENT Method Audit Trail UDE
1810
Map WRITE Event to Atomic Element # and event count using Map MDE
Read
1812
EVENT Method Map MDE
Event, Event Count, Atomic Element #, Object ID, User ID
1814
Write EVENT Audit Trail (if required)
Write
1816
EVENT Method Audit Trail UDE
Atomic Element #, Event Count
1818
Atomic Element Selected?
Yes, Pass
No
1820
Update EVENT Method Map MDE to reflect new data
PASS if update succeeded, FAIL otherwise
EVENT Method
1822
EVENT Method Succeeded?
No
1824
Roll back secure database transaction
1826
WRITE Method Failed
Yes
CONTROL Method (cont'd)
B

FIG. 51b

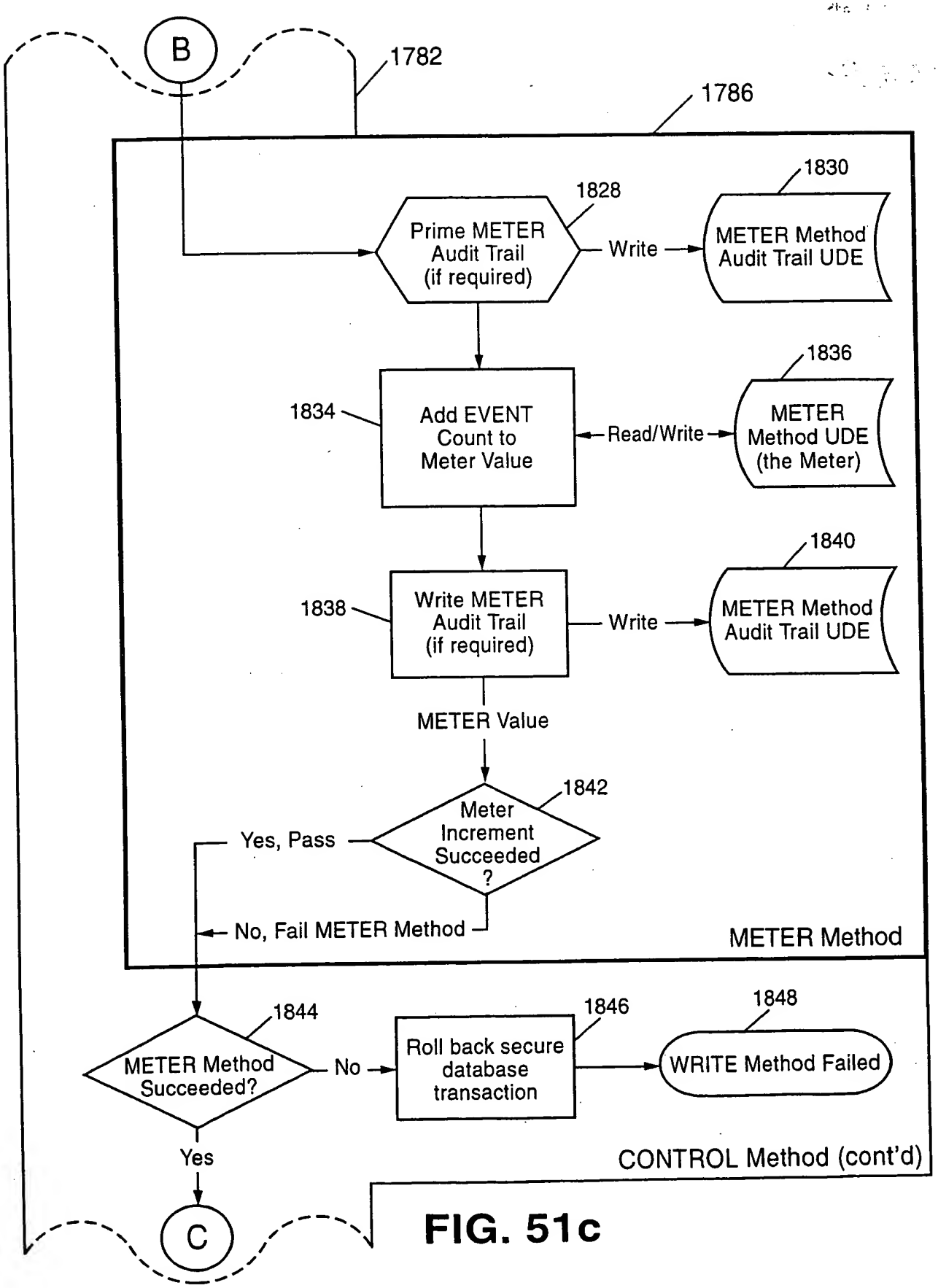

B
1782
1786
1828
Prime METER Audit Trail (if required)
Write
1830
METER Method Audit Trail UDE
1834
Add EVENT Count to Meter Value
Read/Write
1836
METER Method UDE (the Meter)
1838
Write METER Audit Trail (if required)
Write
1840
METER Method Audit Trail UDE
METER Value
1842
Meter Increment Succeeded ?
Yes, Pass
No, Fail METER Method
METER Method
1844
METER Method Succeeded?
No
1846
Roll back secure database transaction
1848
WRITE Method Failed
Yes
CONTROL Method (cont'd)
C

FIG. 51c

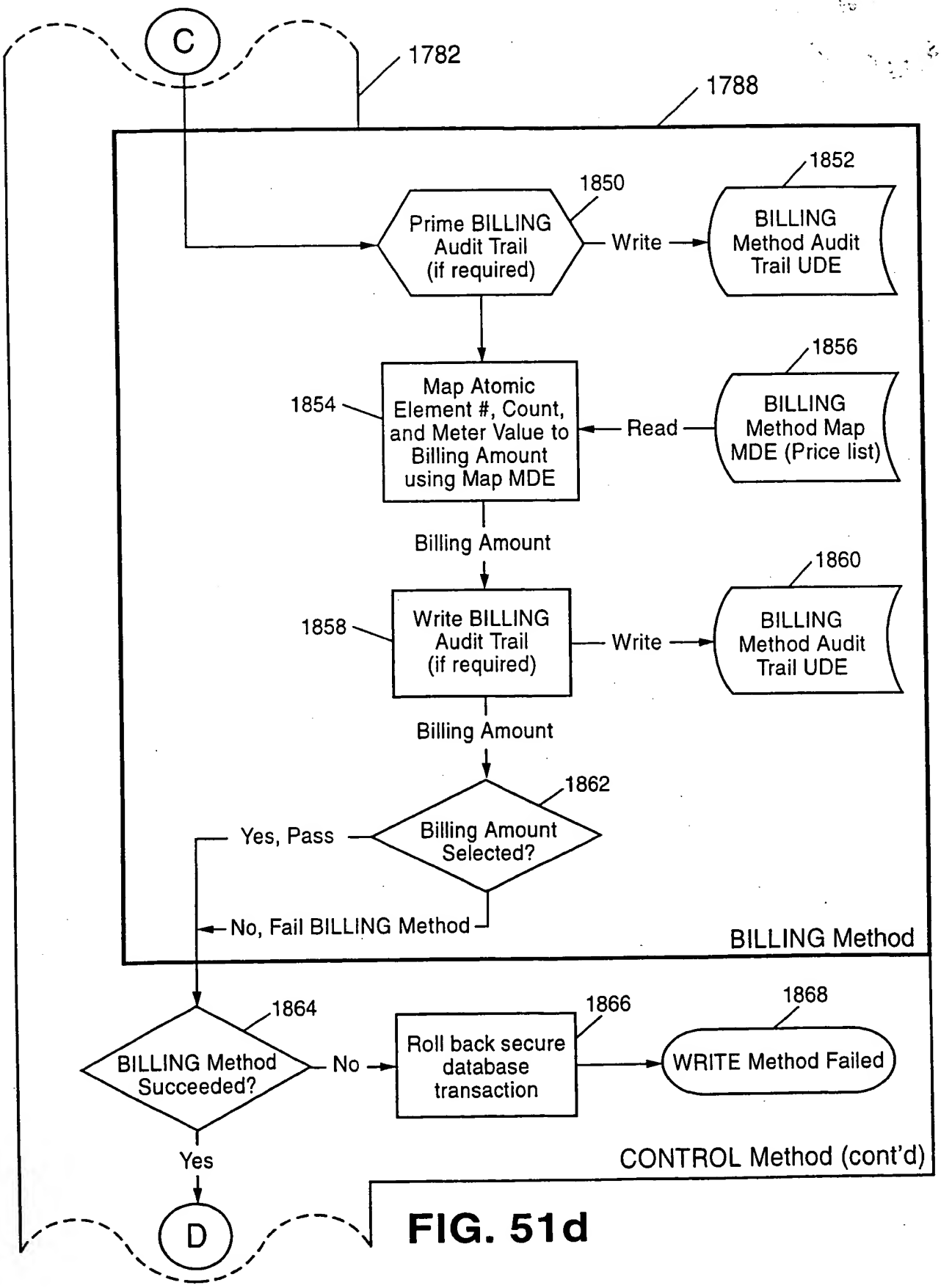

C
1782
1788
1850
Prime BILLING Audit Trail (if required)
Write
1852
BILLING Method Audit Trail UDE
1854
Map Atomic Element #, Count, and Meter Value to Billing Amount using Map MDE
Read
1856
BILLING Method Map MDE (Price list)
Billing Amount
1858
Write BILLING Audit Trail (if required)
Write
1860
BILLING Method Audit Trail UDE
Billing Amount
1862
Billing Amount Selected?
Yes, Pass
No, Fail BILLING Method
BILLING Method
1864
BILLING Method Succeeded?
No
1866
Roll back secure database transaction
1868
WRITE Method Failed
Yes
CONTROL Method (cont'd)
D

FIG. 51d

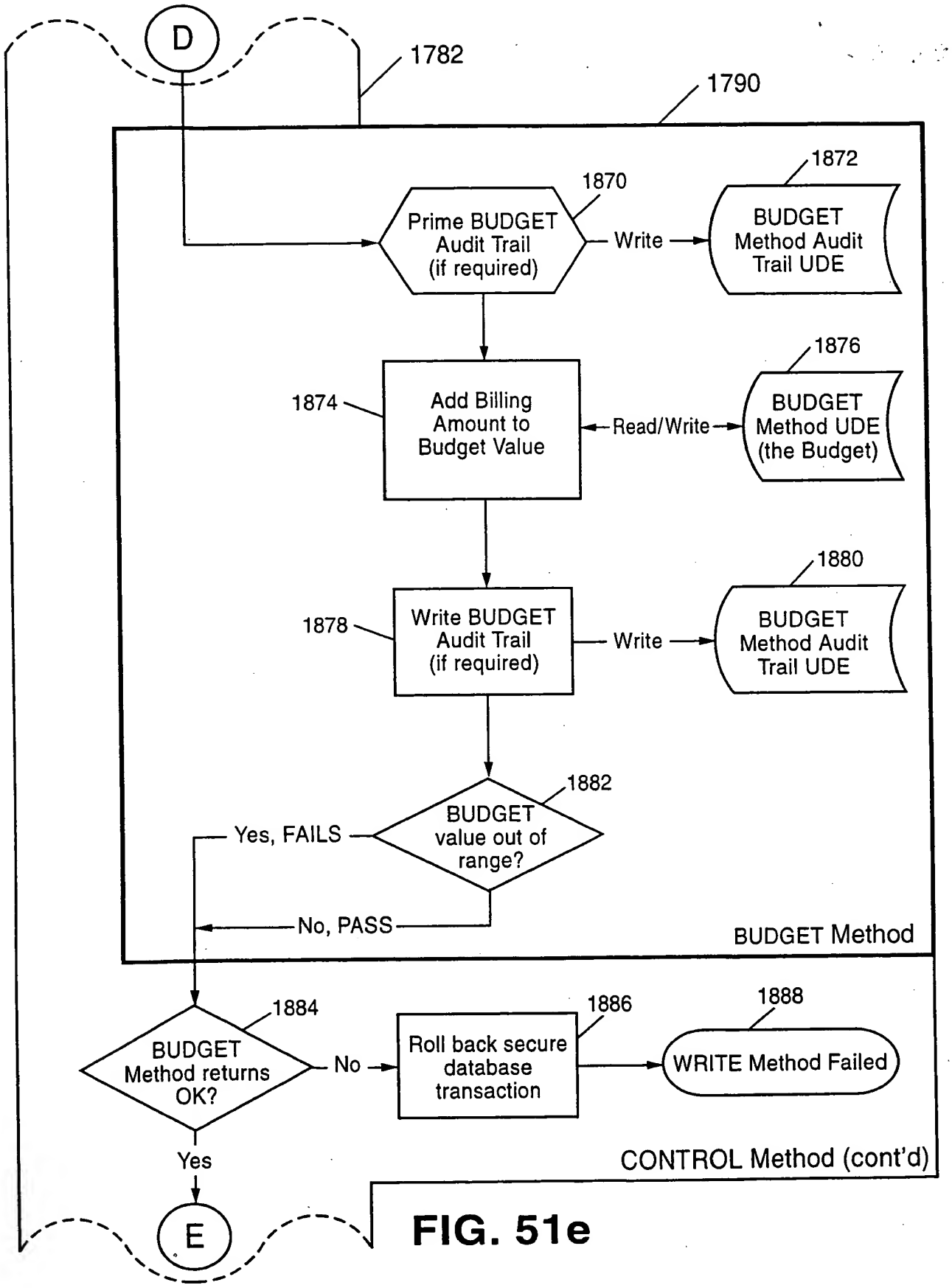

D
1782
1790
1870
Prime BUDGET Audit Trail (if required)
Write
1872
BUDGET Method Audit Trail UDE
1874
Add Billing Amount to Budget Value
Read/Write
1876
BUDGET Method UDE (the Budget)
1878
Write BUDGET Audit Trail (if required)
Write
1880
BUDGET Method Audit Trail UDE
1882
BUDGET value out of range?
Yes, FAILS
No, PASS
BUDGET Method
1884
BUDGET Method returns OK?
No
1886
Roll back secure database transaction
1888
WRITE Method Failed
Yes
CONTROL Method (cont'd)
E

FIG. 51e

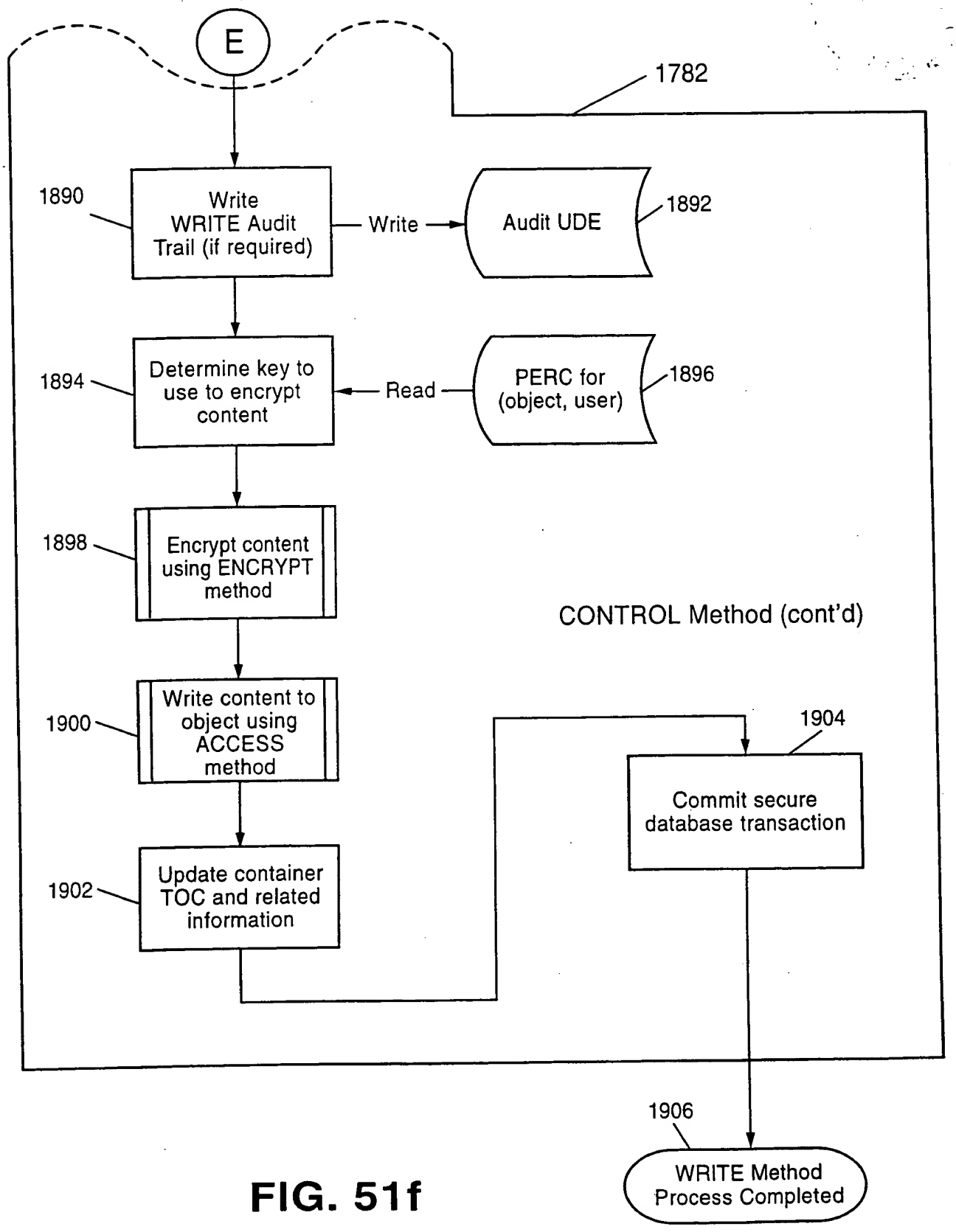

E
1782
1890
Write WRITE Audit Trail (if required)
Write
Audit UDE
1892
1894
Determine key to use to encrypt content
Read
PERC for (object, user)
1896
1898
Encrypt content using ENCRYPT method
CONTROL Method (cont'd)
1900
Write content to object using ACCESS method
1904
Commit secure database transaction
1902
Update container TOC and related information
1906
WRITE Method Process Completed

FIG. 51f

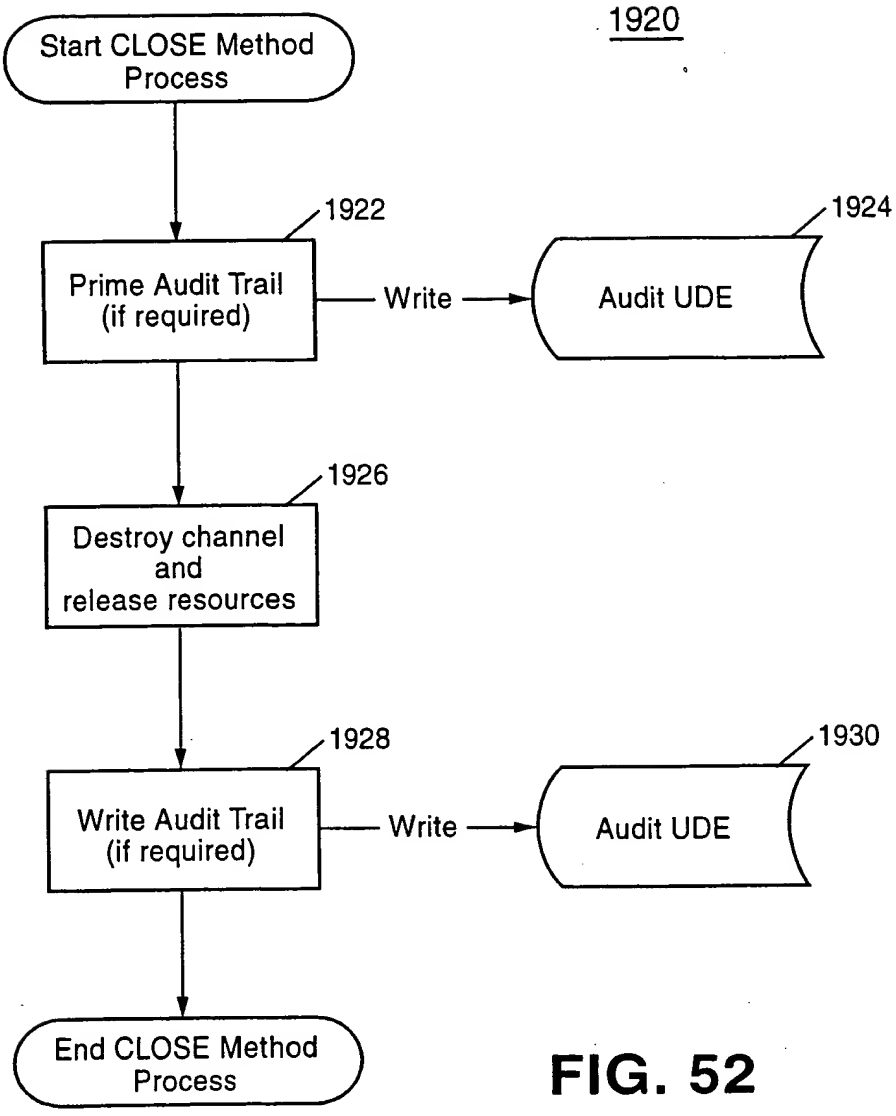

1920
Start CLOSE Method Process
1922
Prime Audit Trail (if required)
Write
1924
Audit UDE
1926
Destroy channel and release resources
1928
Write Audit Trail (if required)
Write
1930
Audit UDE
End CLOSE Method Process

FIG. 52

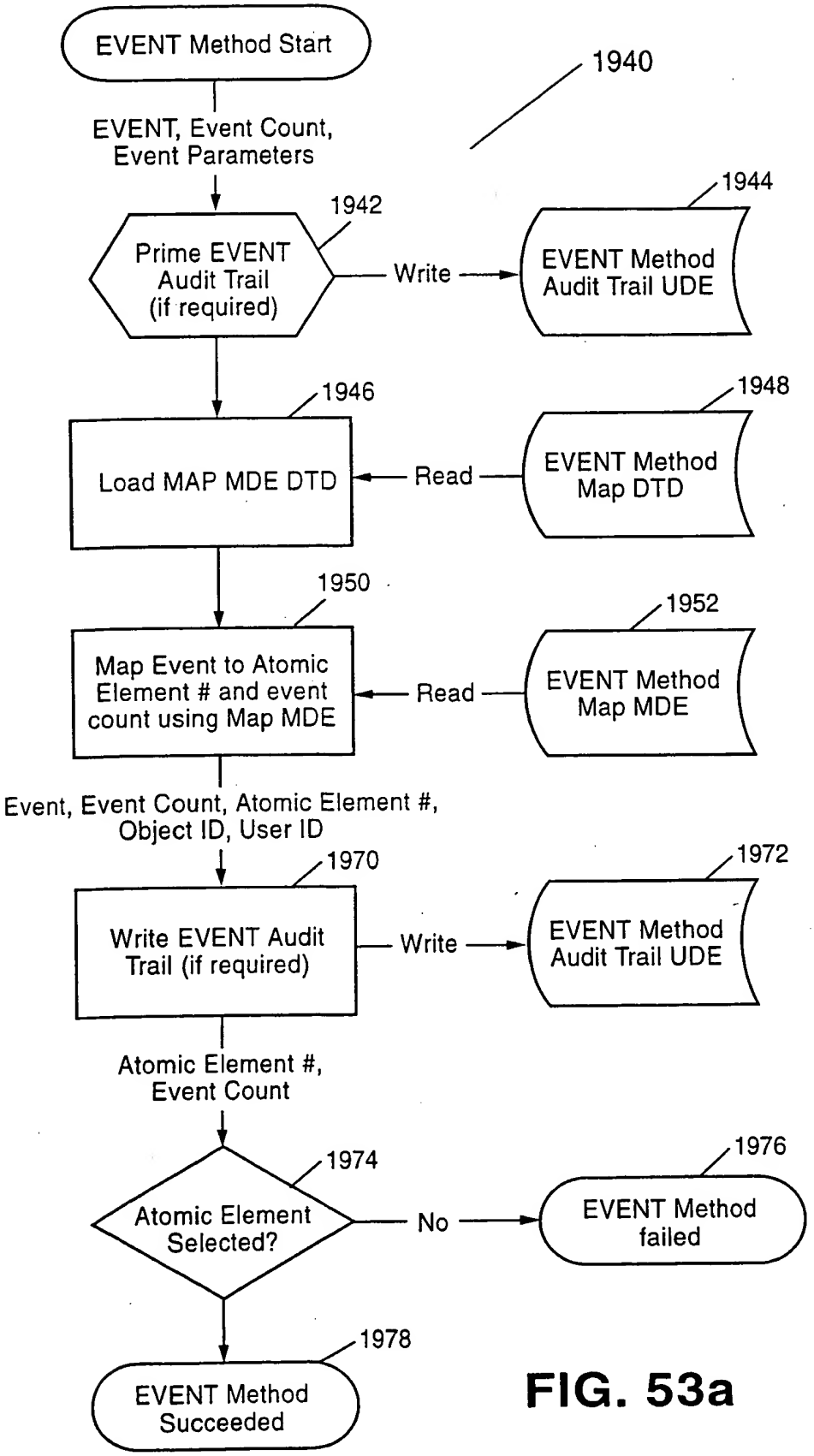

EVENT Method Start
1940
EVENT, Event Count, Event Parameters
1942
Prime EVENT Audit Trail (if required)
Write
1944
EVENT Method Audit Trail UDE
1946
Load MAP MDE DTD
Read
1948
EVENT Method Map DTD
1950
Map Event to Atomic Element # and event count using Map MDE
Read
1952
EVENT Method Map MDE
Event, Event Count, Atomic Element #, Object ID, User ID
1970
Write EVENT Audit Trail (if required)
Write
1972
EVENT Method Audit Trail UDE
Atomic Element #, Event Count
1974
Atomic Element Selected?
No
1976
EVENT Method failed
1978
EVENT Method Succeeded

FIG. 53a

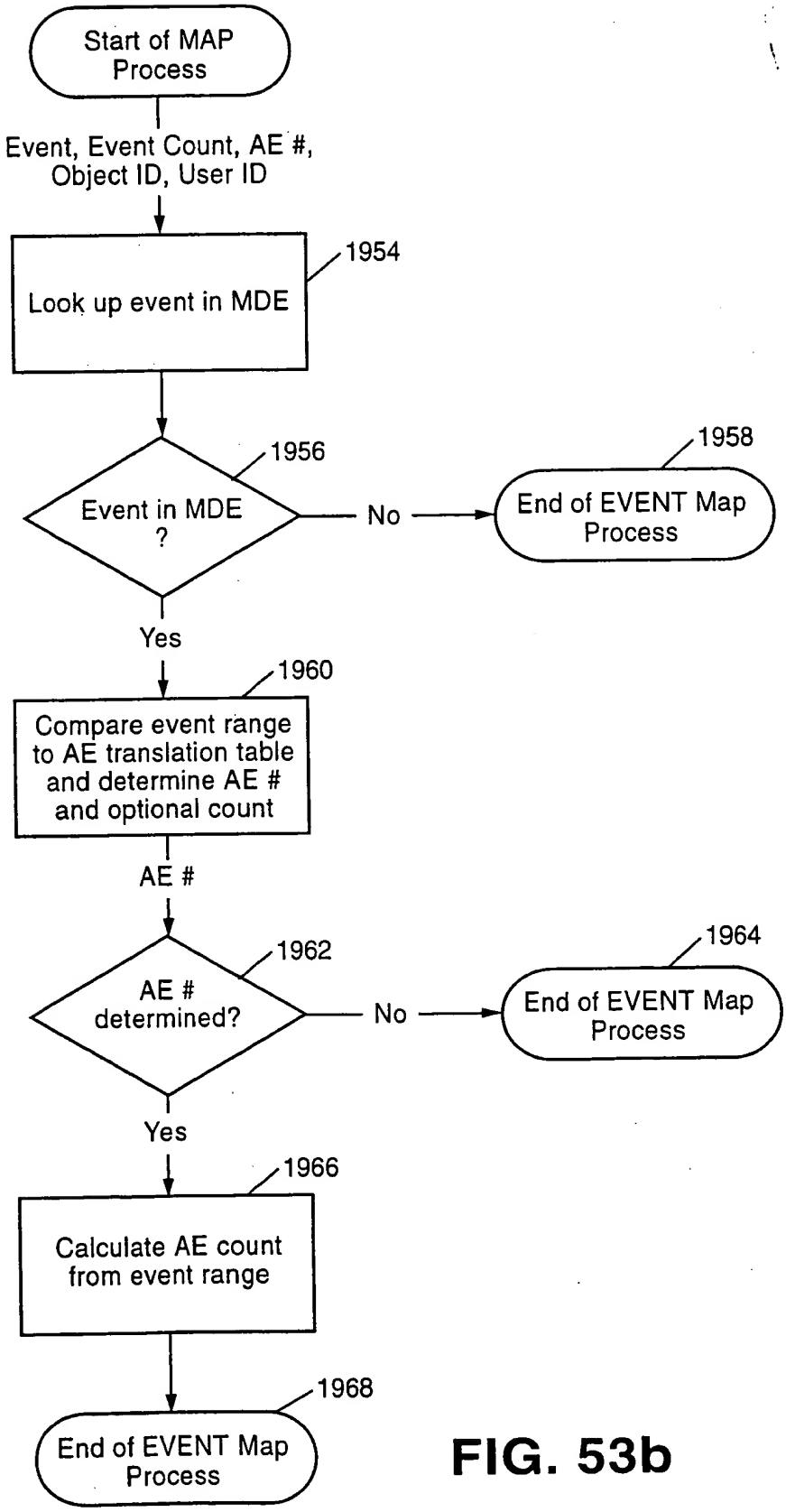

Start of MAP Process
Event, Event Count, AE #, Object ID, User ID
Look up event in MDE
1954
Event in MDE ?
1956
No
End of EVENT Map Process
1958
Yes
Compare event range to AE translation table and determine AE # and optional count
1960
AE #
AE # determined?
1962
No
End of EVENT Map Process
1964
Yes
Calculate AE count from event range
1966
End of EVENT Map Process
1968

FIG. 53b

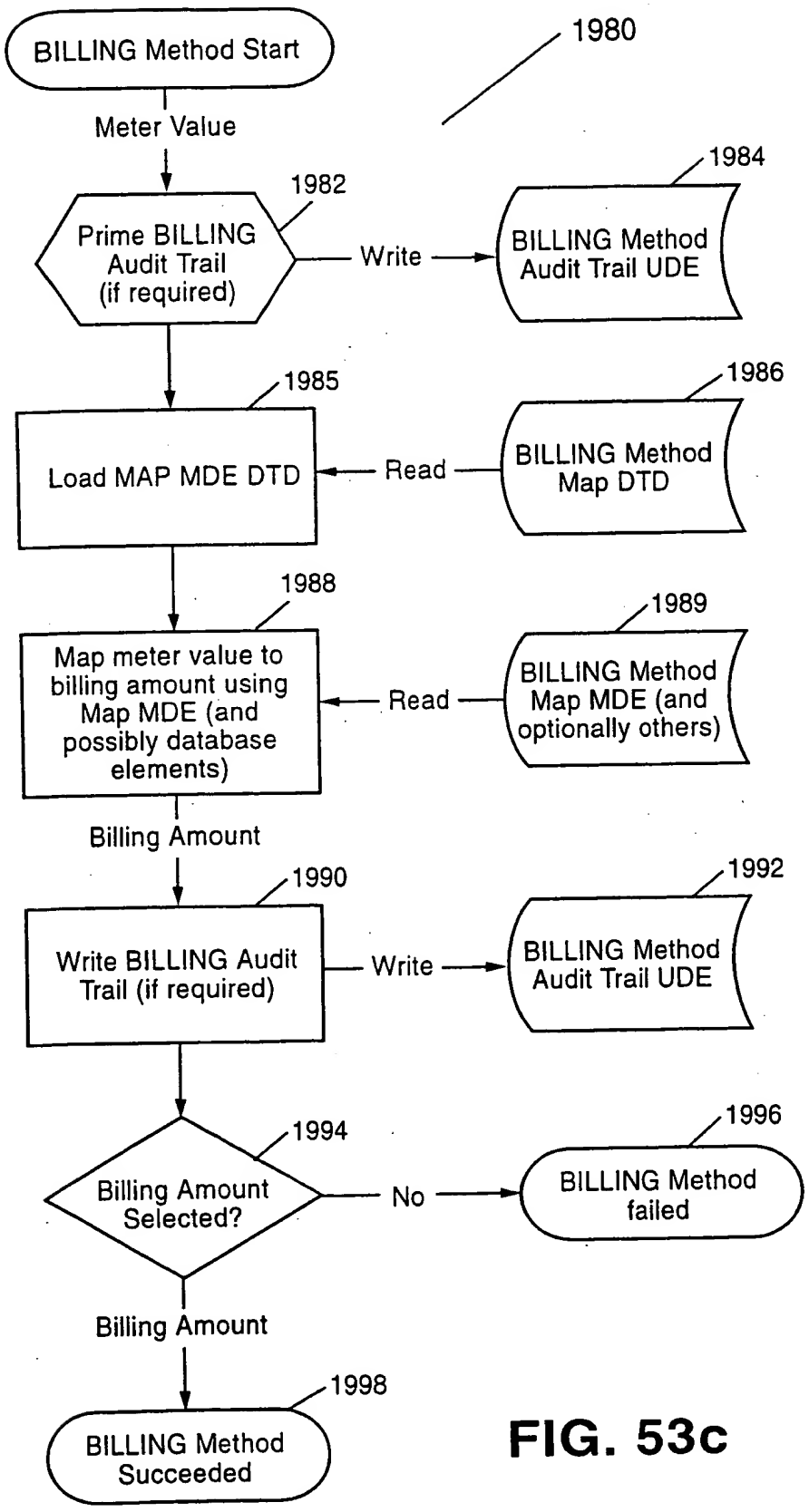

BILLING Method Start
1980
Meter Value
1982
Prime BILLING Audit Trail (if required)
Write
1984
BILLING Method Audit Trail UDE
1985
Load MAP MDE DTD
Read
1986
BILLING Method Map DTD
1988
Map meter value to billing amount using Map MDE (and possibly database elements)
Read
1989
BILLING Method Map MDE (and optionally others)
Billing Amount
1990
Write BILLING Audit Trail (if required)
Write
1992
BILLING Method Audit Trail UDE
1994
Billing Amount Selected?
No
1996
BILLING Method failed
Billing Amount
1998
BILLING Method Succeeded

FIG. 53c

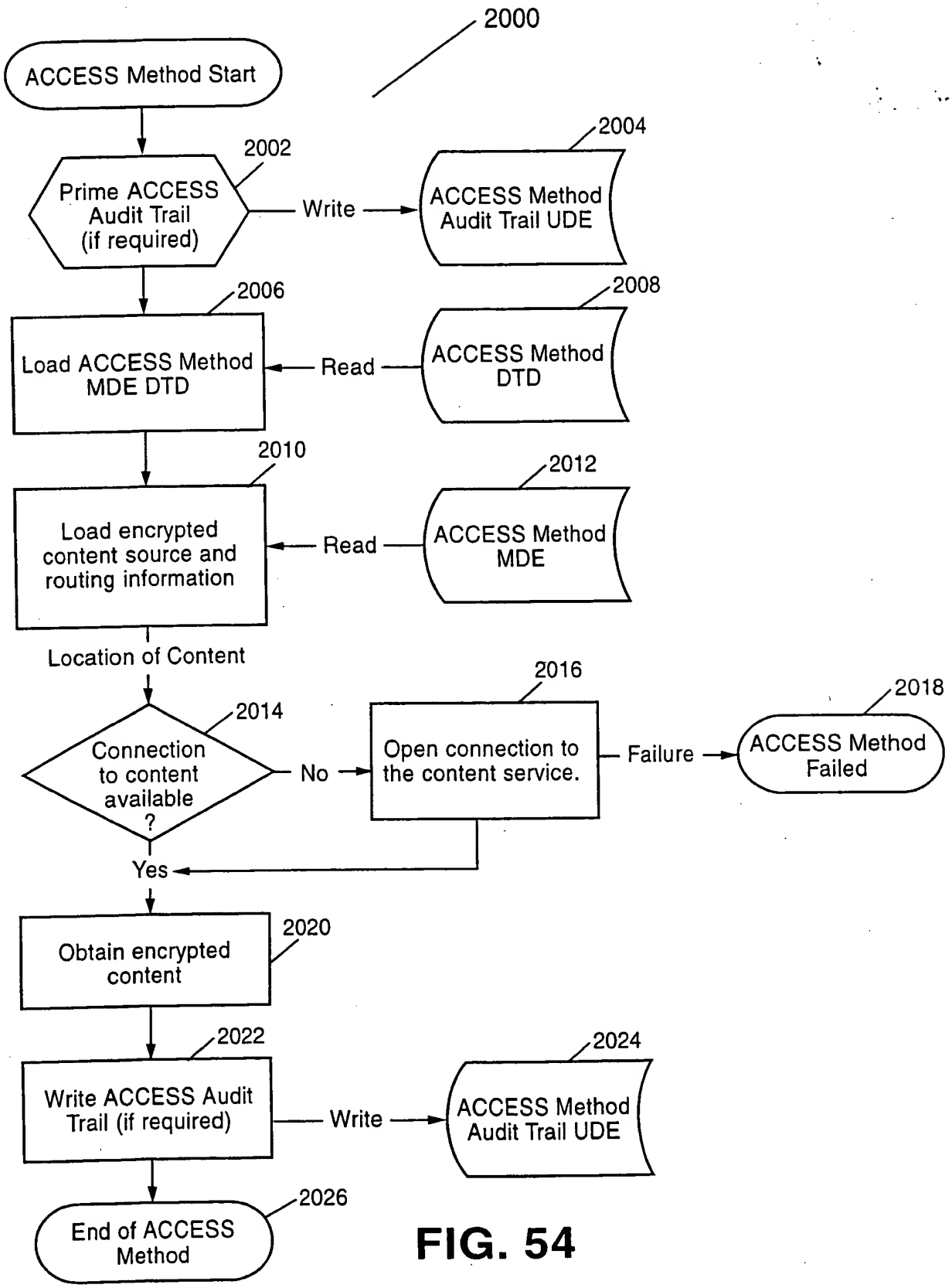

2000
ACCESS Method Start
2002
Prime ACCESS Audit Trail (if required)
Write
2004
ACCESS Method Audit Trail UDE
2006
Load ACCESS Method MDE DTD
Read
2008
ACCESS Method DTD
2010
Load encrypted content source and routing information
Read
2012
ACCESS Method MDE
Location of Content
2014
Connection to content available ?
No
2016
Open connection to the content service.
Failure
2018
ACCESS Method Failed
Yes
2020
Obtain encrypted content
2022
Write ACCESS Audit Trail (if required)
Write
2024
ACCESS Method Audit Trail UDE
2026
End of ACCESS Method

FIG. 54

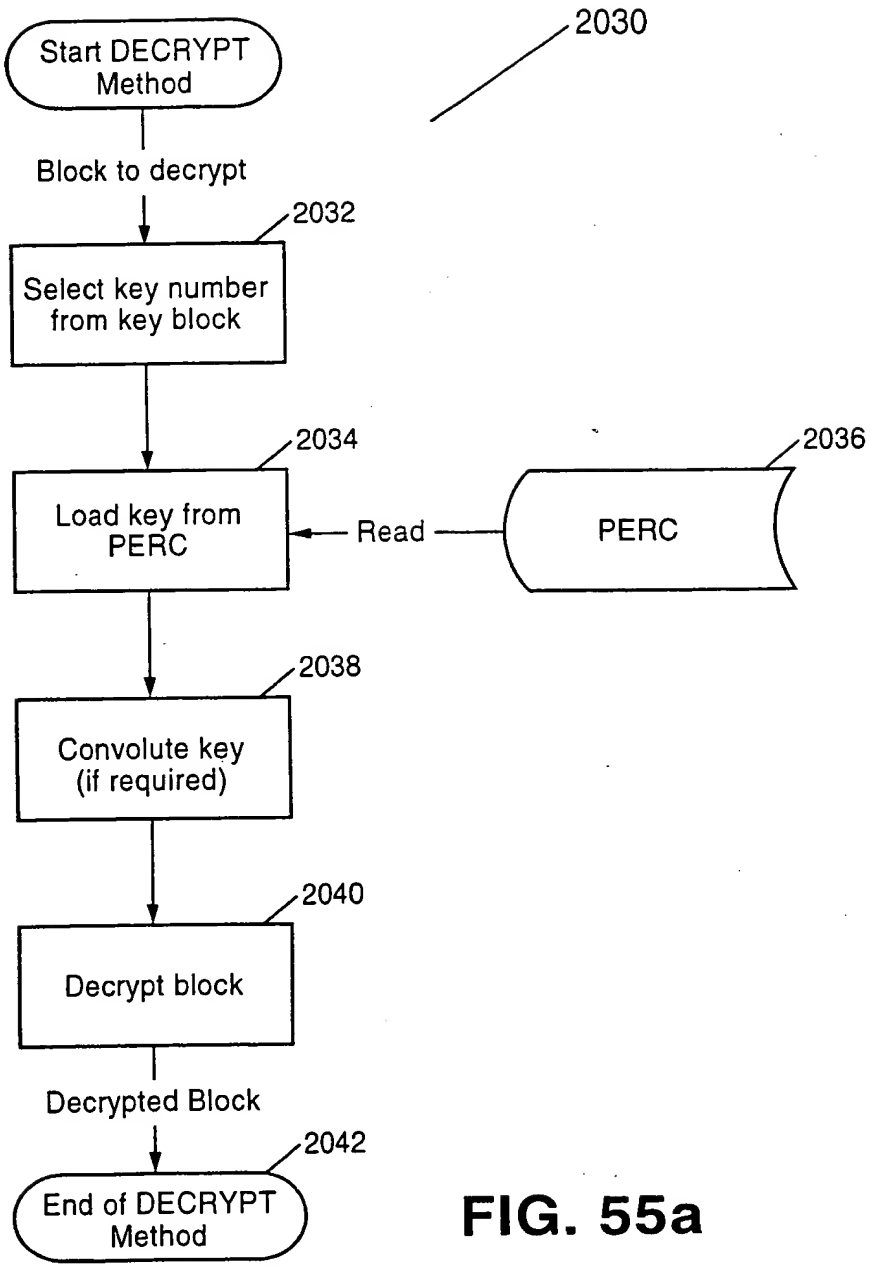

2030
Start DECRYPT Method
Block to decrypt
2032
Select key number from key block
2034
Load key from PERC
Read
2036
PERC
2038
Convolute key (if required)
2040
Decrypt block
Decrypted Block
2042
End of DECRYPT Method

FIG. 55a

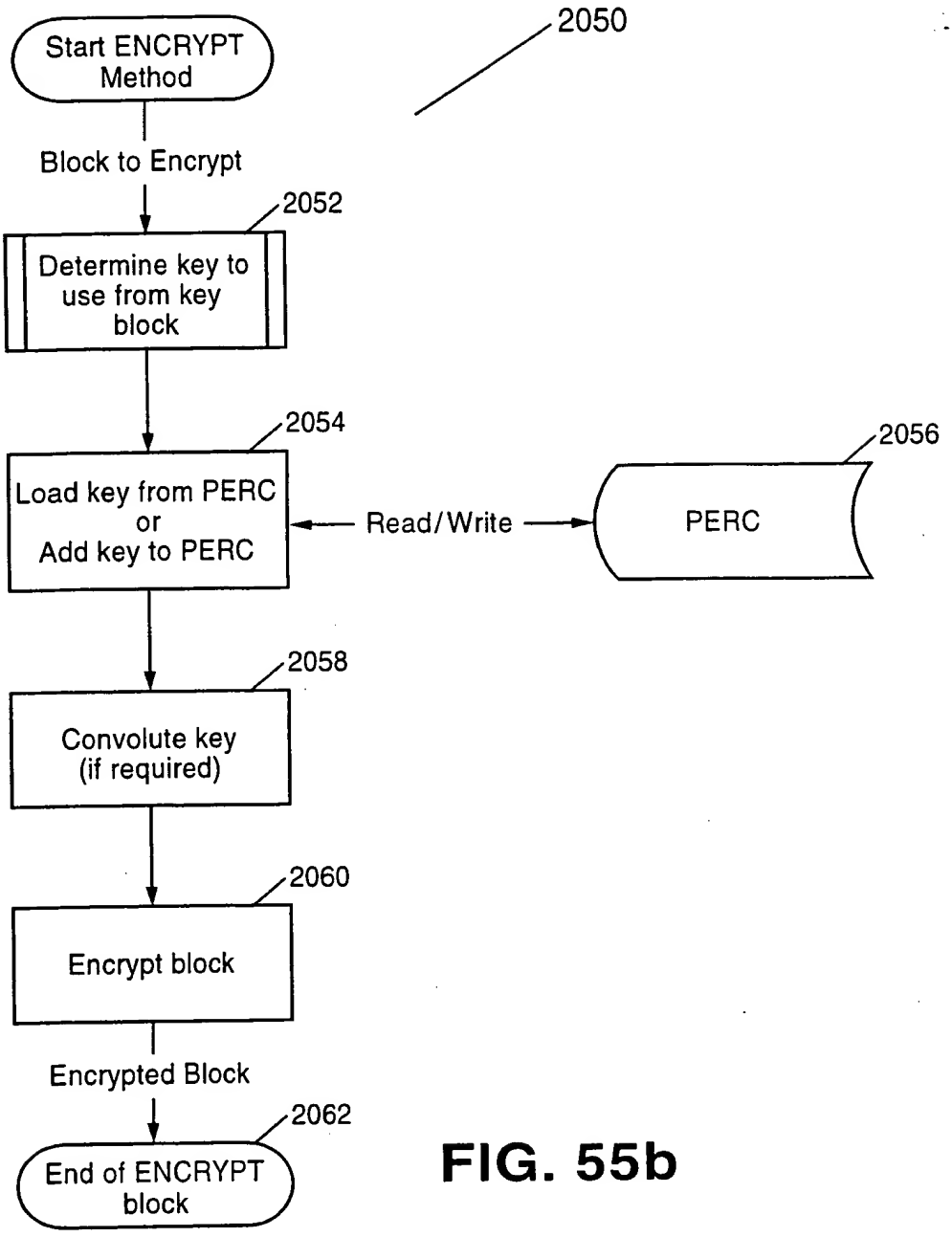

2050
Start ENCRYPT Method
Block to Encrypt
2052
Determine key to use from key block
2054
Load key from PERC or Add key to PERC
Read/Write
2056
PERC
2058
Convolute key (if required)
2060
Encrypt block
Encrypted Block
2062
End of ENCRYPT block

FIG. 55b

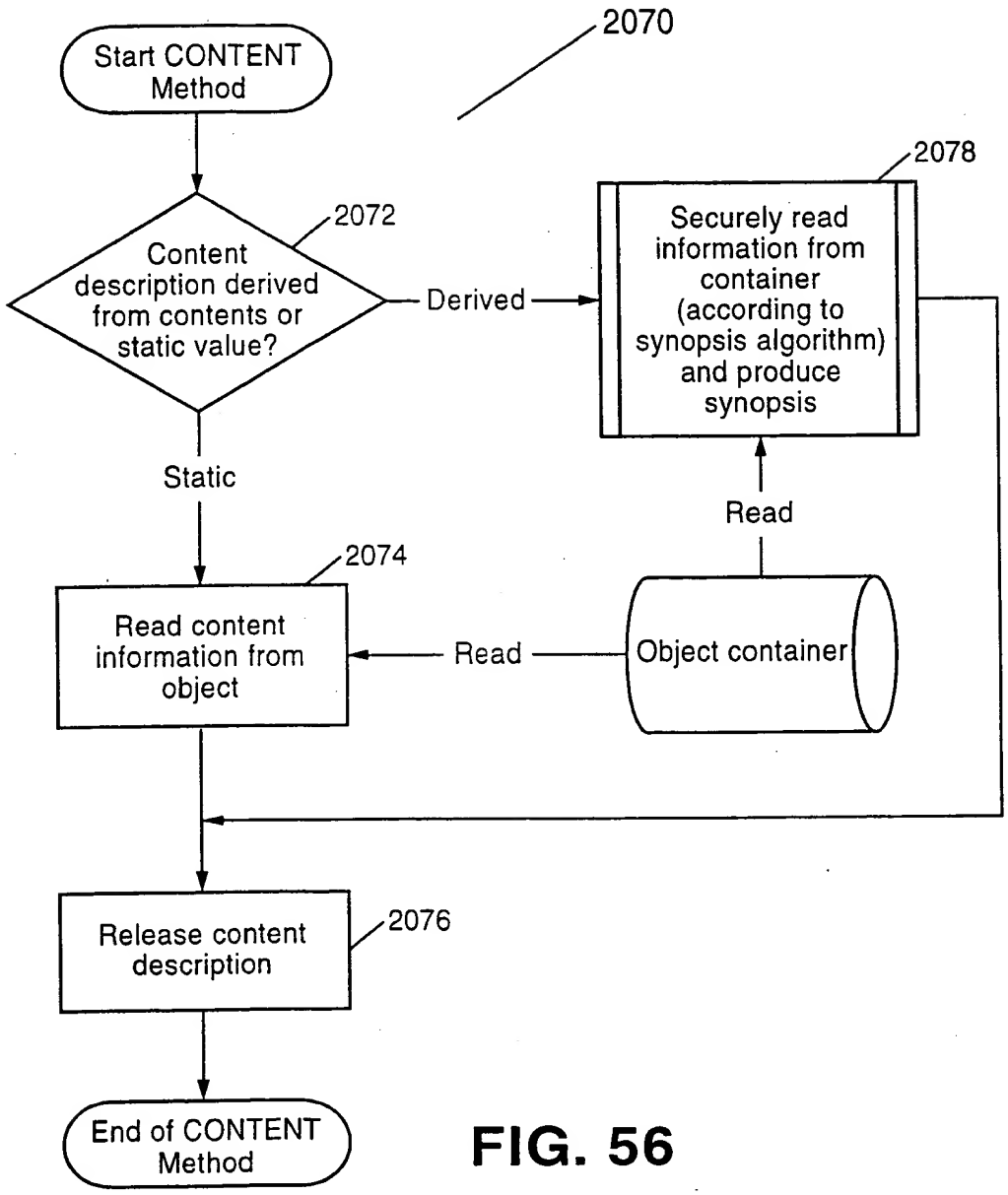

2070
Start CONTENT Method
2072
Content description derived from contents or static value?
Derived
2078
Securely read information from container (according to synopsis algorithm) and produce synopsis
Static
Read
2074
Read content information from object
Read
Object container
Release content description
2076
End of CONTENT Method

FIG. 56

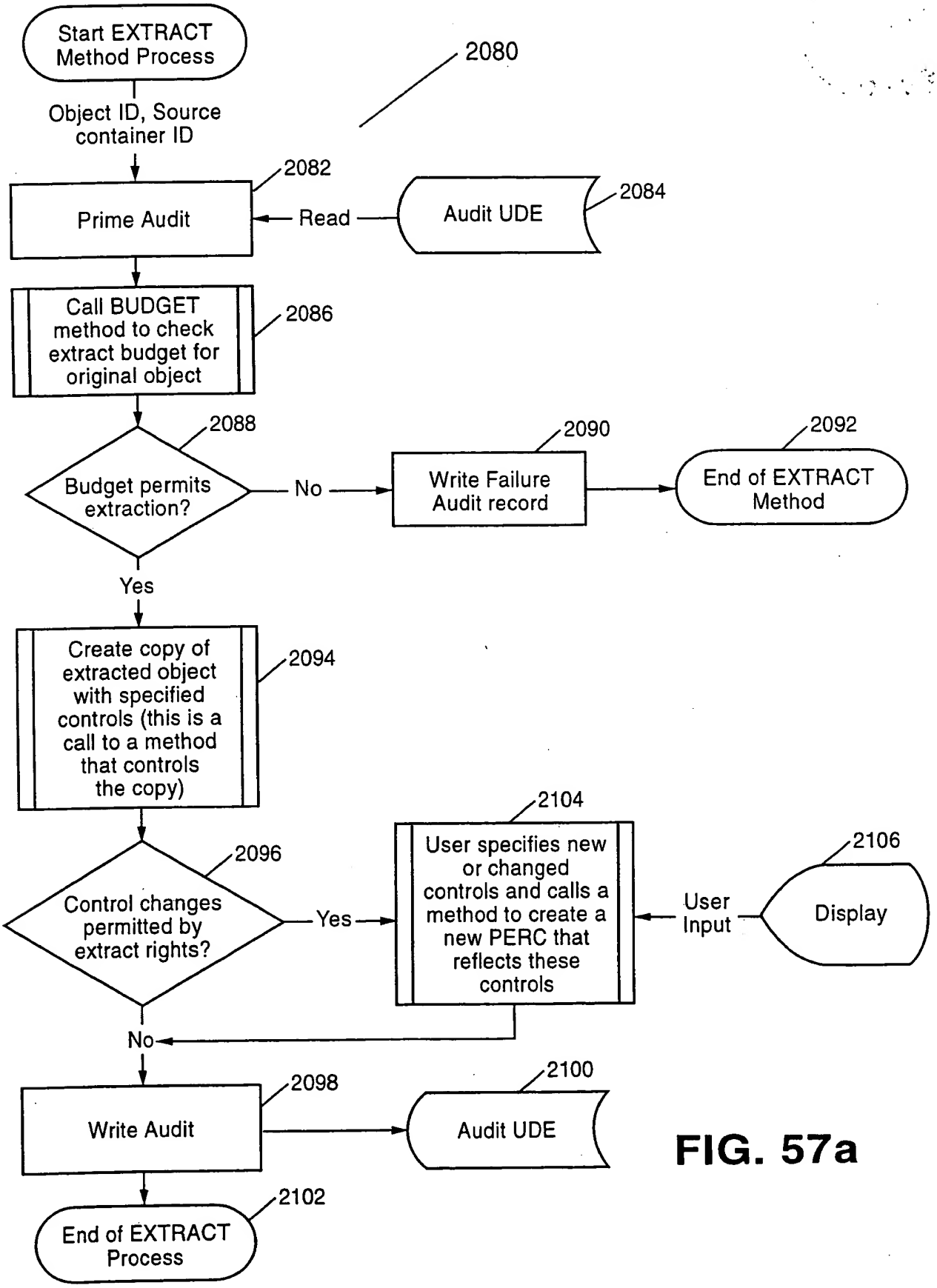

Start EXTRACT Method Process
2080
Object ID, Source container ID
2082
Prime Audit
Read
Audit UDE
2084
Call BUDGET method to check extract budget for original object
2086
2088
Budget permits extraction?
No
2090
Write Failure Audit record
2092
End of EXTRACT Method
Yes
Create copy of extracted object with specified controls (this is a call to a method that controls the copy)
2094
2104
2096
Control changes permitted by extract rights?
Yes
User specifies new or changed controls and calls a method to create a new PERC that reflects these controls
2106
User Input
Display
No
2098
Write Audit
2100
Audit UDE
2102
End of EXTRACT Process

FIG. 57a

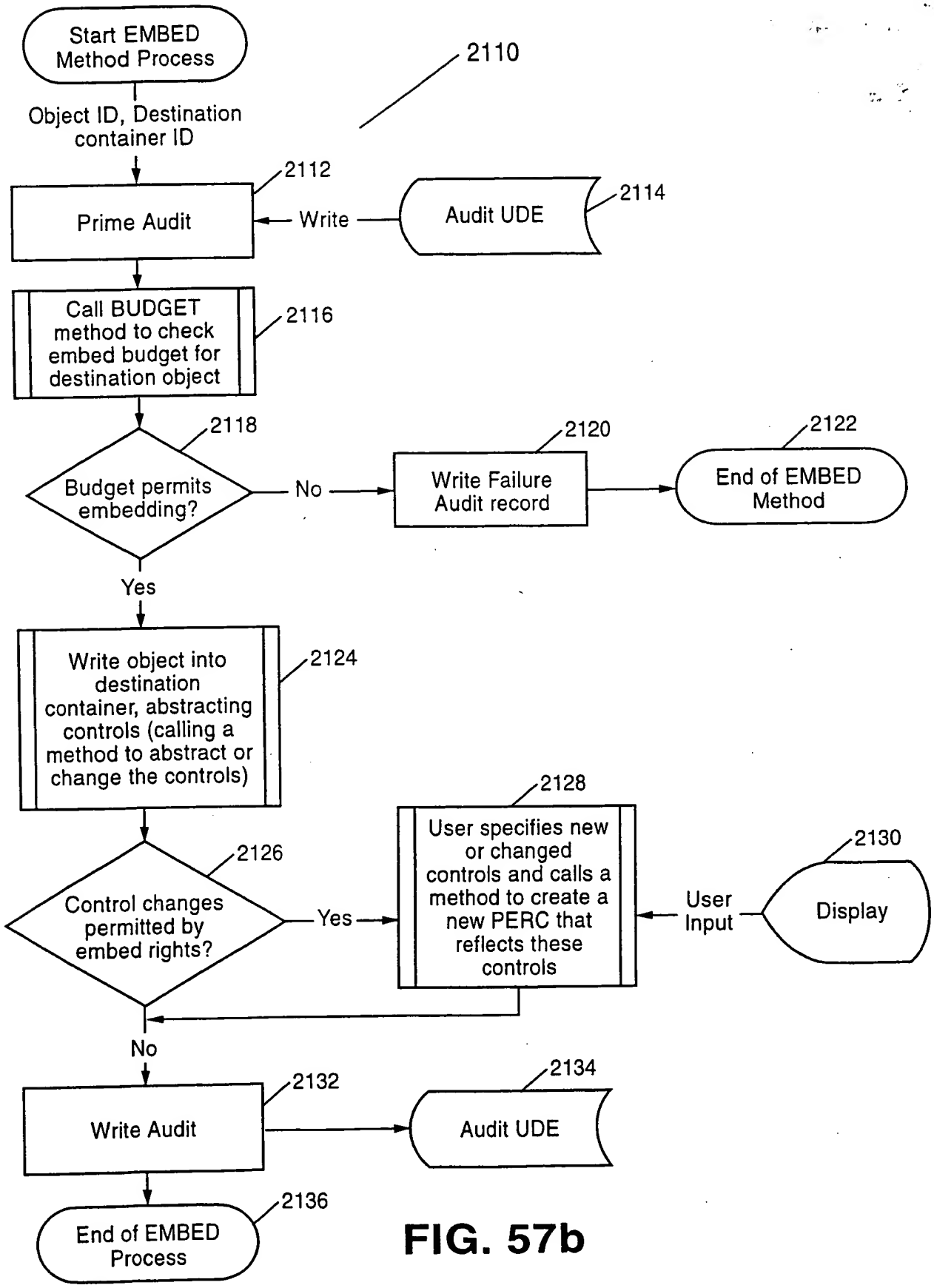

Start EMBED Method Process
2110
Object ID, Destination container ID
2112
Prime Audit
Write
Audit UDE
2114
Call BUDGET method to check embed budget for destination object
2116
2118
Budget permits embedding?
No
2120
Write Failure Audit record
2122
End of EMBED Method
Yes
Write object into destination container, abstracting controls (calling a method to abstract or change the controls)
2124
2128
User specifies new or changed controls and calls a method to create a new PERC that reflects these controls
2130
User Input
Display
2126
Control changes permitted by embed rights?
Yes
No
2132
Write Audit
2134
Audit UDE
2136
End of EMBED Process

FIG. 57b

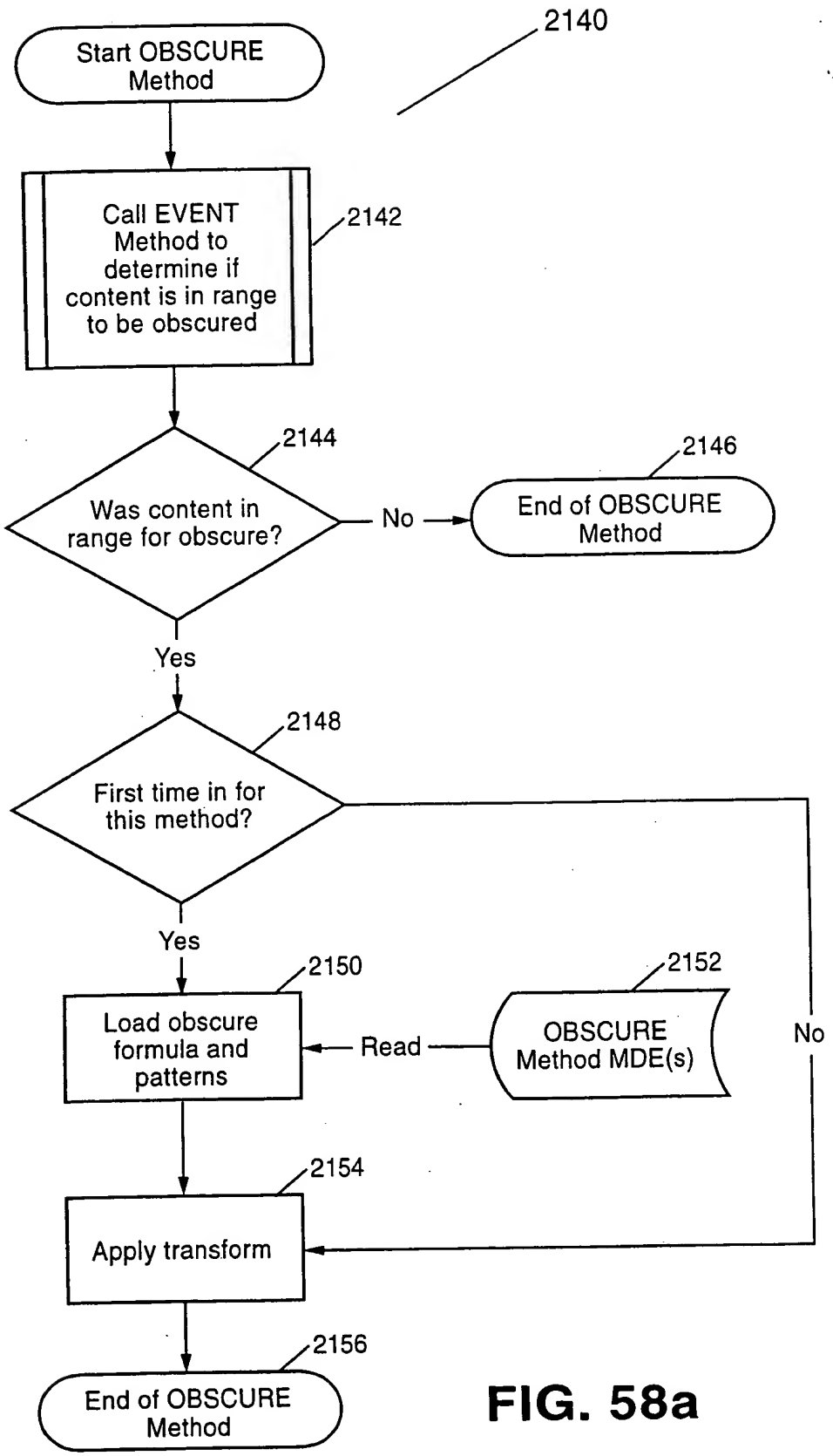

2140
Start OBSCURE Method
Call EVENT Method to determine if content is in range to be obscured
2142
2144
Was content in range for obscure?
No
2146
End of OBSCURE Method
Yes
2148
First time in for this method?
Yes
No
2150
Load obscure formula and patterns
Read
2152
OBSCURE Method MDE(s)
2154
Apply transform
2156
End of OBSCURE Method

FIG. 58a

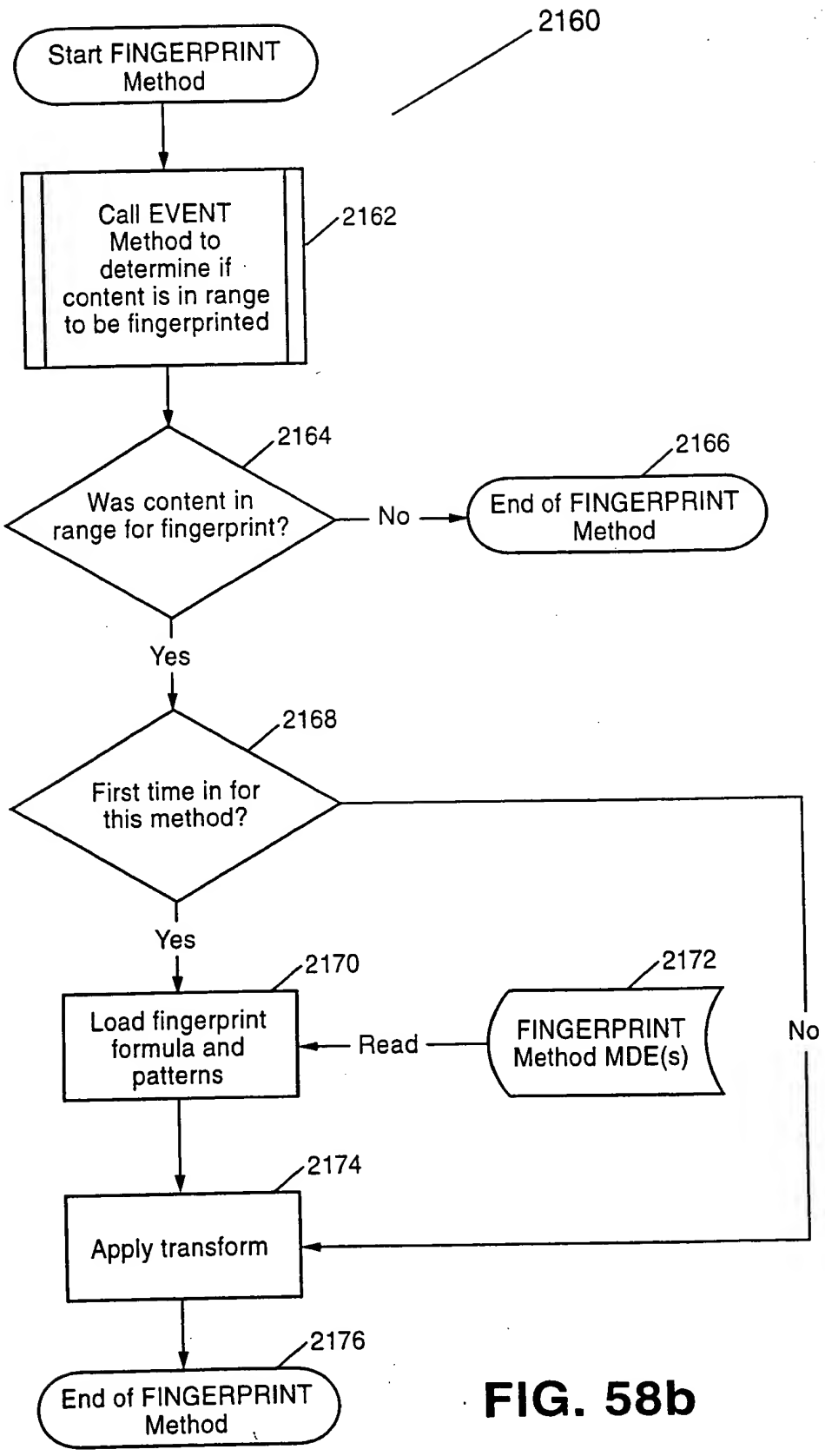

2160
Start FINGERPRINT Method
Call EVENT Method to determine if content is in range to be fingerprinted
2162
2164
Was content in range for fingerprint?
No
2166
End of FINGERPRINT Method
Yes
2168
First time in for this method?
Yes
2170
Load fingerprint formula and patterns
Read
2172
FINGERPRINT Method MDE(s)
No
2174
Apply transform
2176
End of FINGERPRINT Method

FIG. 58b

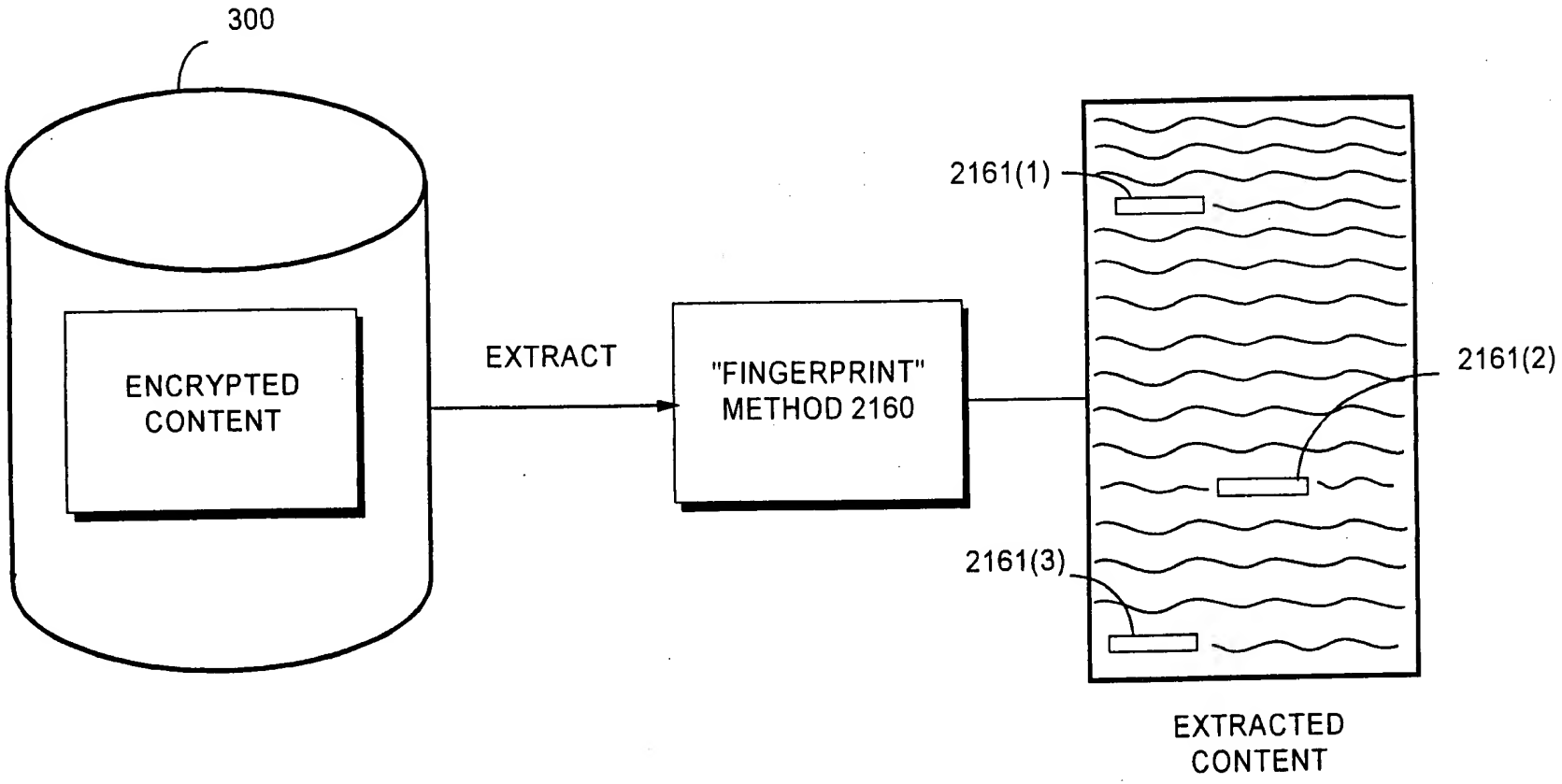

300
ENCRYPTED CONTENT
EXTRACT
"FINGERPRINT" METHOD 2160
2161(1)
2161(2)
2161(3)
EXTRACTED CONTENT

FIG. 58C

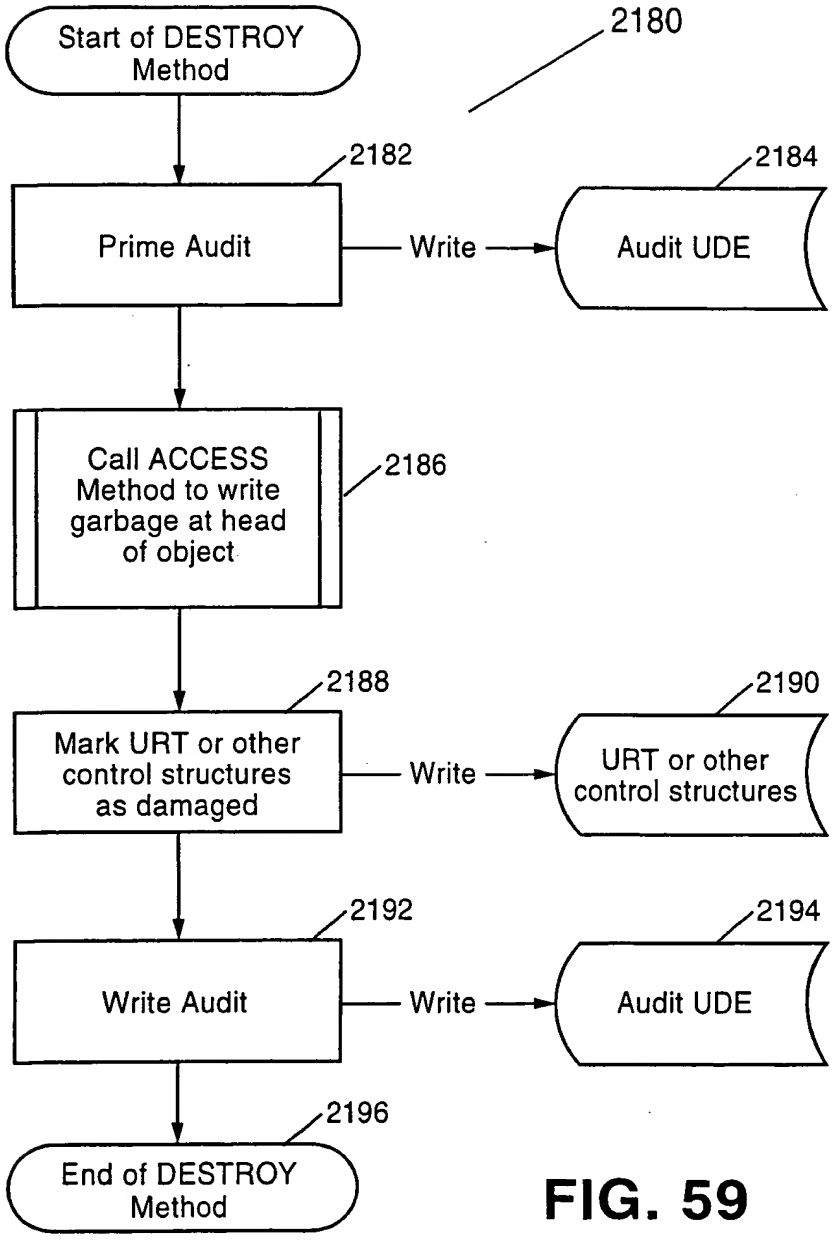

Start of DESTROY Method
2180
2182
Prime Audit
Write
2184
Audit UDE
Call ACCESS Method to write garbage at head of object
2186
2188
Mark URT or other control structures as damaged
Write
2190
URT or other control structures
2192
Write Audit
Write
2194
Audit UDE
2196
End of DESTROY Method

FIG. 59

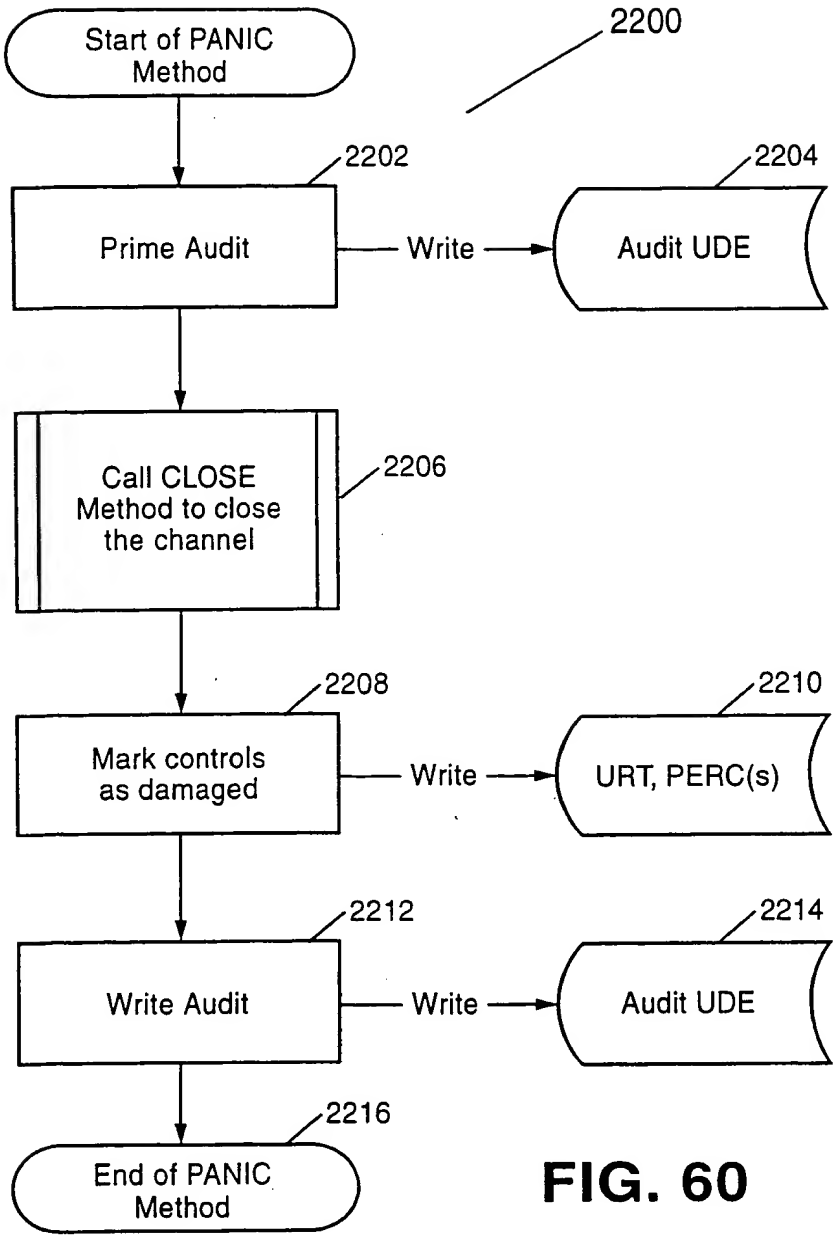

Start of PANIC Method
2200
2202
Prime Audit
Write
2204
Audit UDE
Call CLOSE Method to close the channel
2206
2208
Mark controls as damaged
Write
2210
URT, PERC(s)
2212
Write Audit
Write
2214
Audit UDE
2216
End of PANIC Method

FIG. 60

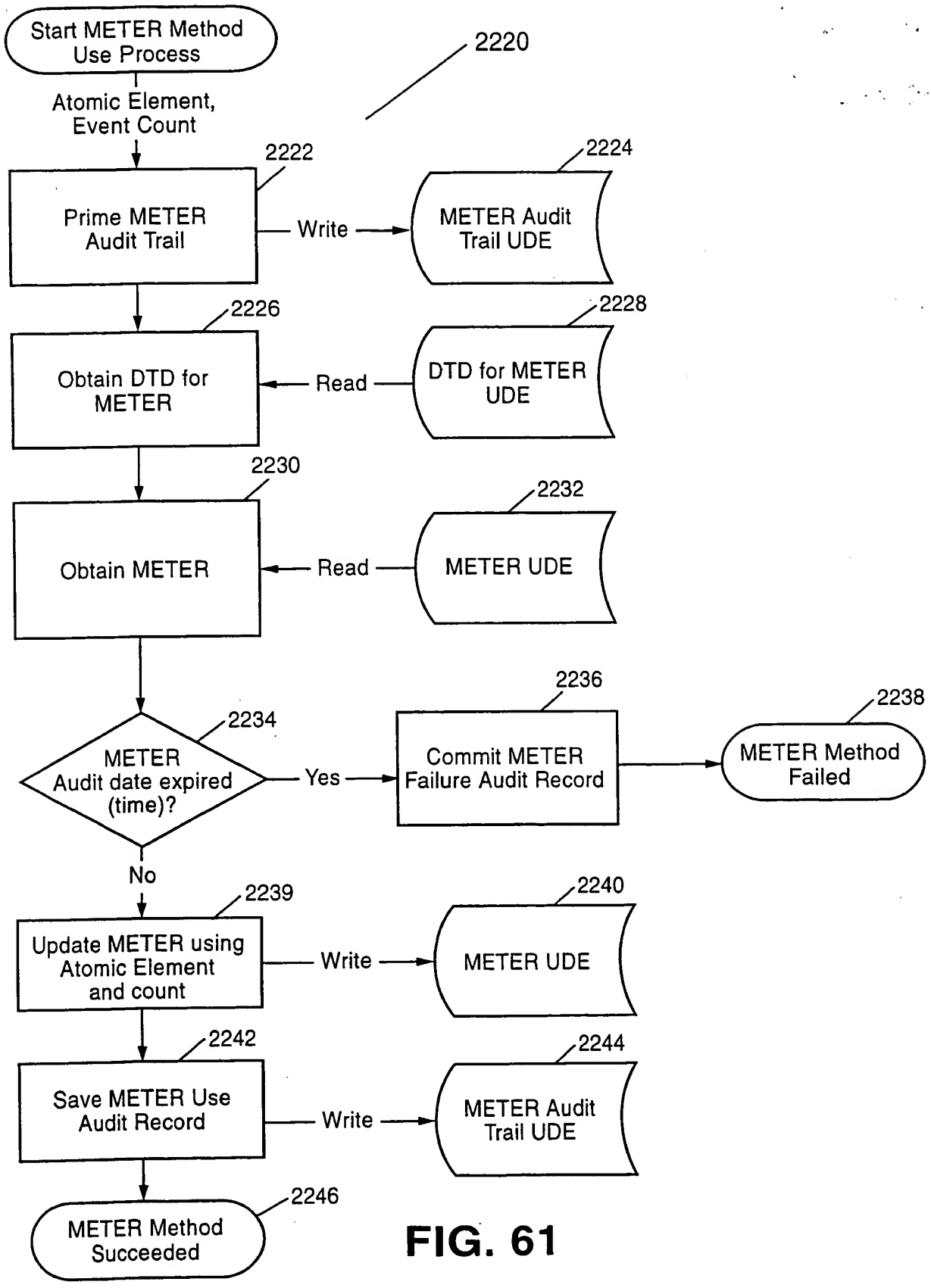
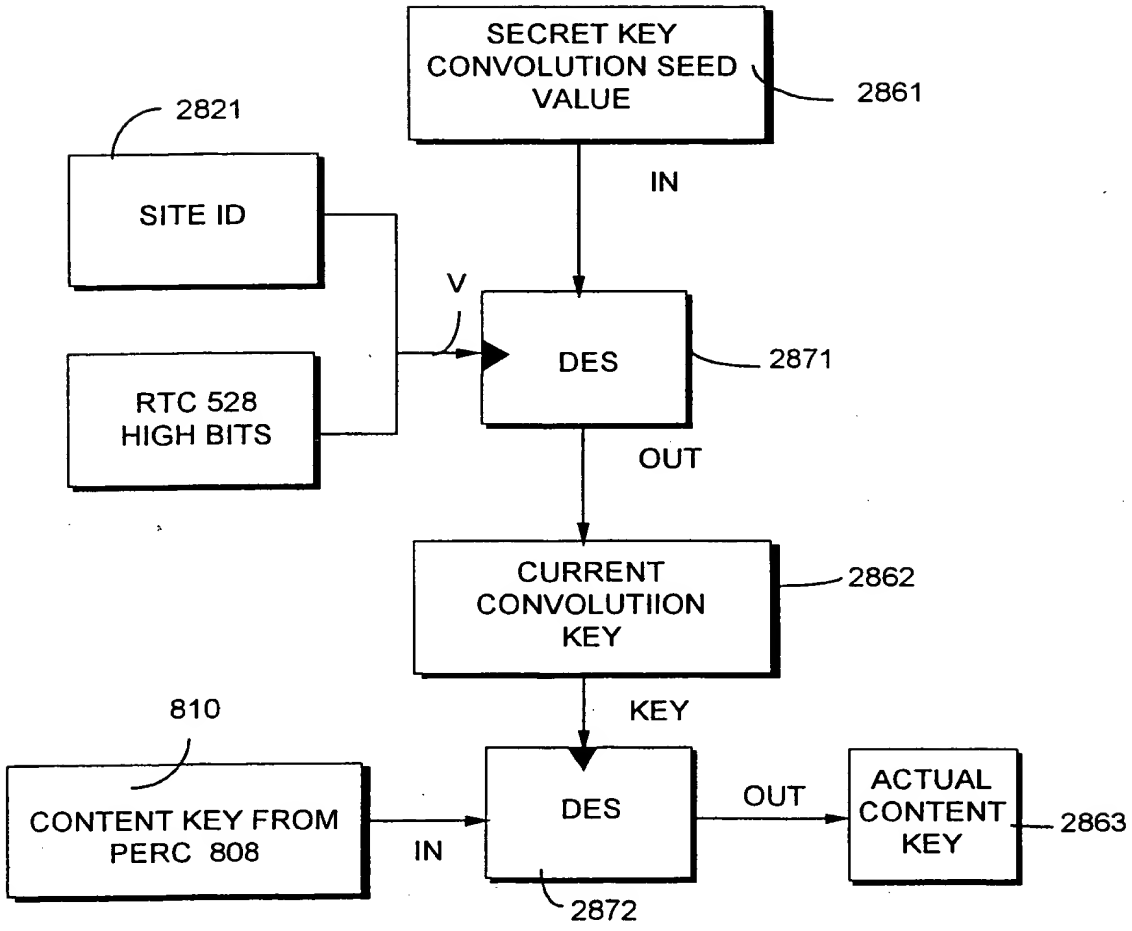

Start METER Method Use Process
2220
Atomic Element, Event Count
2222
Prime METER Audit Trail
Write
2224
METER Audit Trail UDE
2226
Obtain DTD for METER
Read
2228
DTD for METER UDE
2230
Obtain METER
Read
2232
METER UDE
2234
METER Audit date expired (time)?
Yes
2236
Commit METER Failure Audit Record
2238
METER Method Failed
No
2239
Update METER using Atomic Element and count
Write
2240
METER UDE
2242
Save METER Use Audit Record
Write
2244
METER Audit Trail UDE
2246
METER Method Succeeded

FIG. 61

FIG. 62


SECRET KEY CONVOLUTION SEED VALUE
2861
2821
SITE ID
IN
V
DES
2871
RTC 528 HIGH BITS
OUT
CURRENT CONVOLUTIION KEY
2862
810
KEY
CONTENT KEY FROM PERC 808
IN
DES
OUT
ACTUAL CONTENT KEY
2863
2872

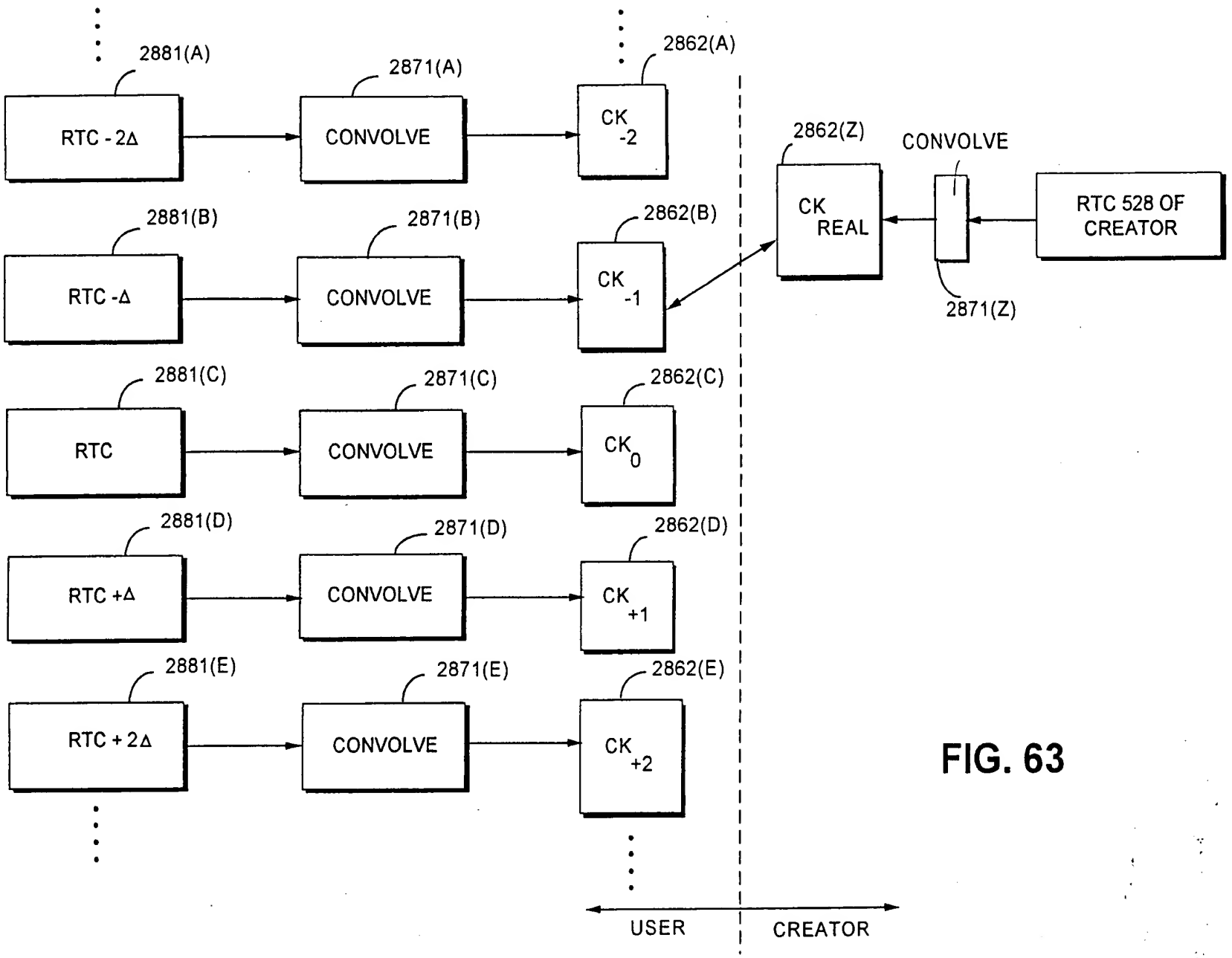

2881(A)
2871(A)
2862(A)
RTC - 2Δ
CONVOLVE
CK -2
2862(Z)
CONVOLVE
CK REAL
RTC 528 OF CREATOR
2881(B)
2871(B)
2862(B)
RTC -Δ
CONVOLVE
CK -1
2871(Z)
2881(C)
2871(C)
2862(C)
RTC
CONVOLVE
CK 0
2881(D)
2871(D)
2862(D)
RTC +Δ
CONVOLVE
CK +1
2881(E)
2871(E)
2862(E)
RTC + 2Δ
CONVOLVE
CK +2
USER
CREATOR

FIG. 63

FIG. 64

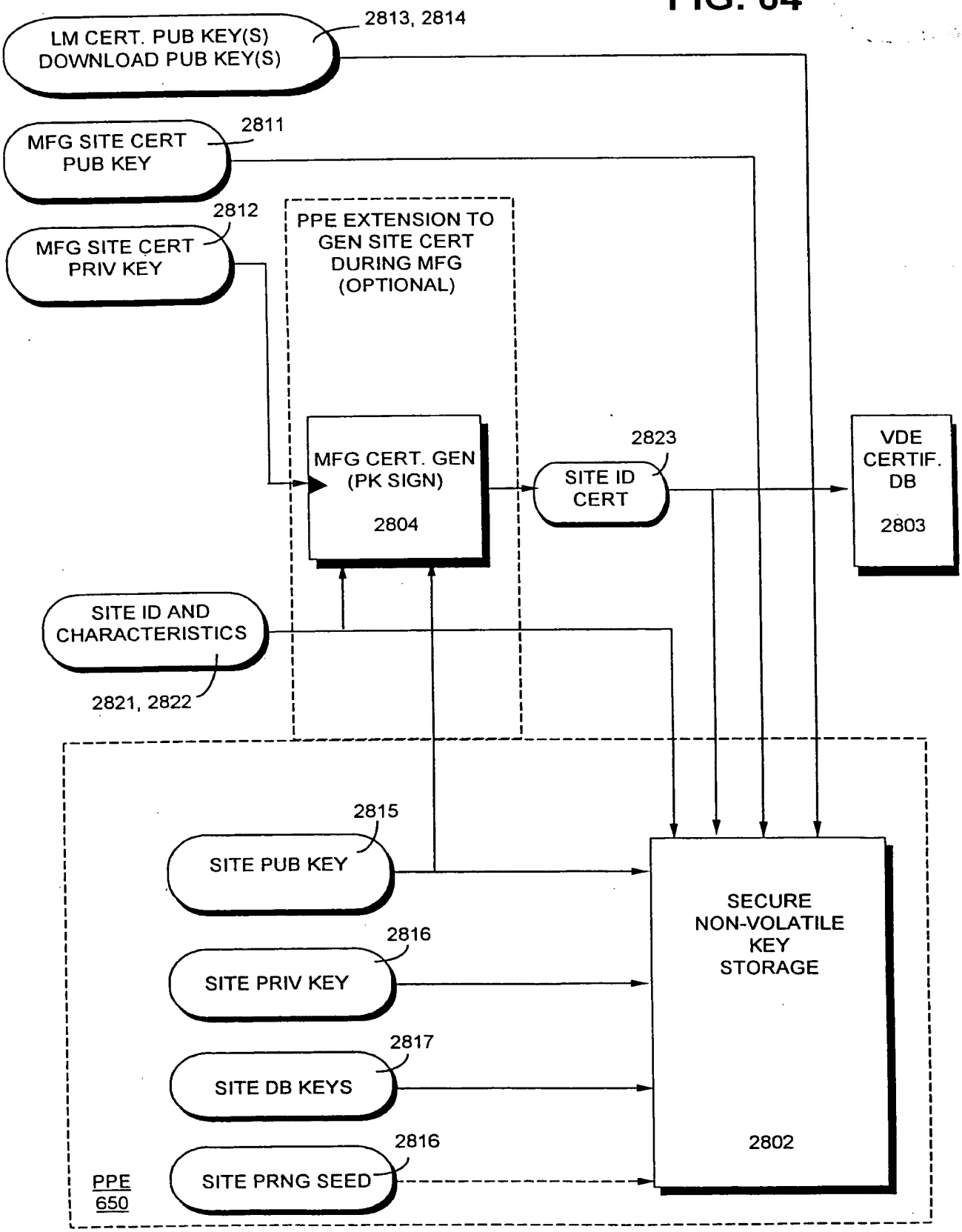

LM CERT. PUB KEY(S)
DOWNLOAD PUB KEY(S)
2813, 2814
MFG SITE CERT
PUB KEY
2811
MFG SITE CERT
PRIV KEY
2812
PPE EXTENSION TO
GEN SITE CERT
DURING MFG
(OPTIONAL)
MFG CERT. GEN
(PK SIGN)
2804
SITE ID
CERT
2823
VDE
CERTIF.
DB
2803
SITE ID AND
CHARACTERISTICS
2821, 2822
2815
SITE PUB KEY
2816
SITE PRIV KEY
2817
SITE DB KEYS
2816
SITE PRNG SEED
SECURE
NON-VOLATILE
KEY
STORAGE
2802
PPE
650

FIG. 65

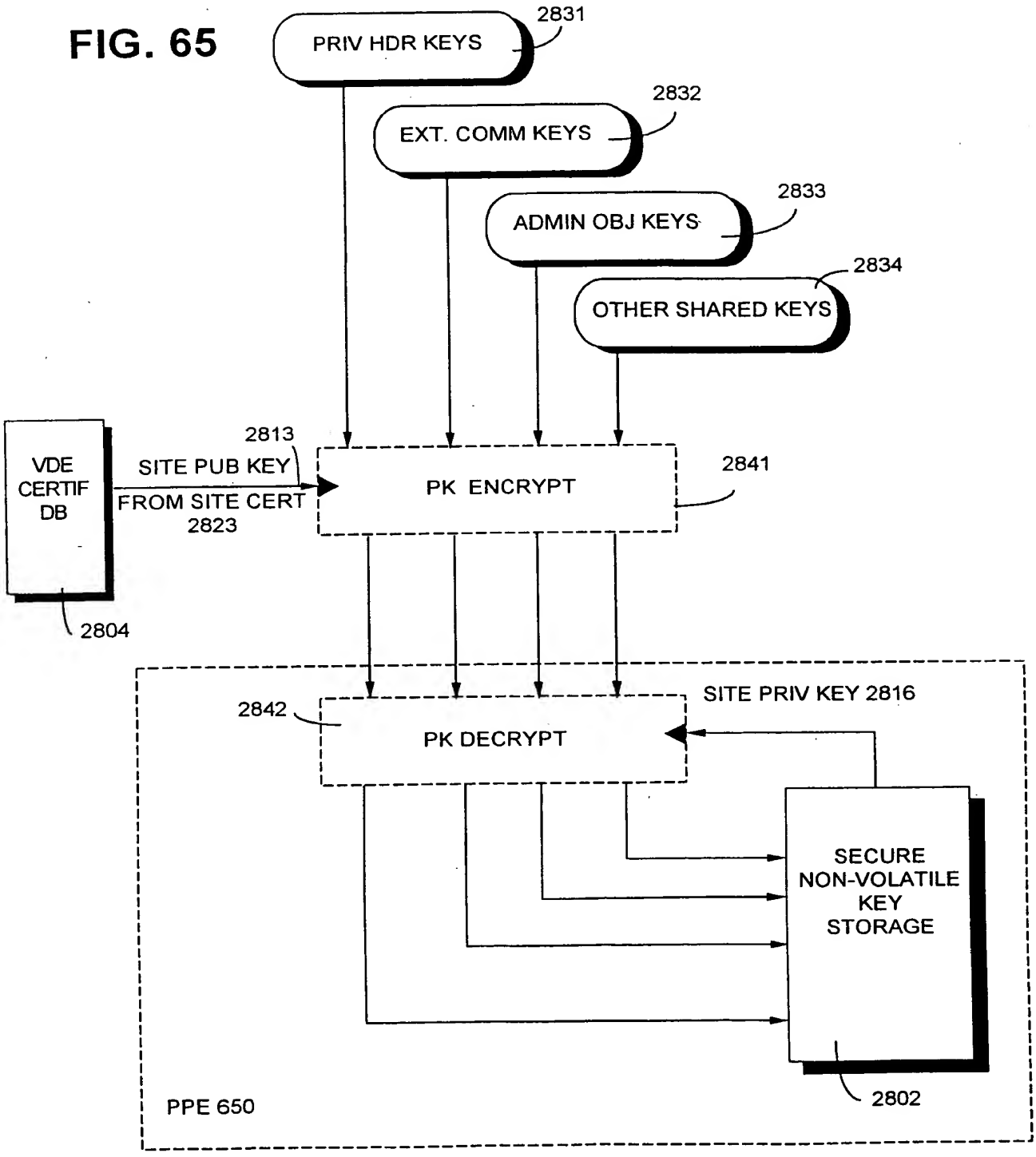
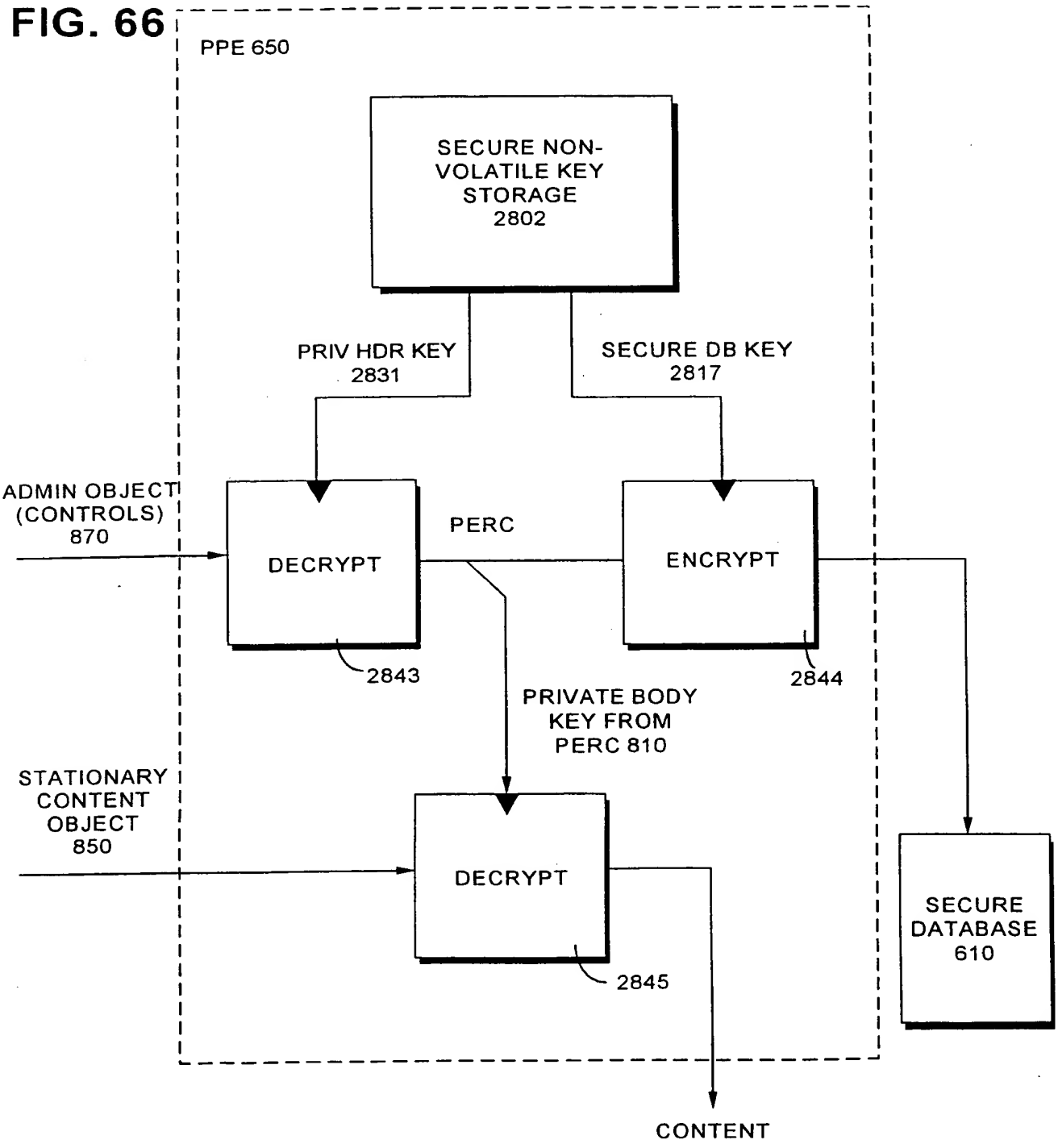

PRIV HDR KEYS
2831
EXT. COMM KEYS
2832
ADMIN OBJ KEYS
2833
OTHER SHARED KEYS
2834
VDE CERTIF DB
2804
SITE PUB KEY FROM SITE CERT 2823
2813
PK ENCRYPT
2841
SITE PRIV KEY 2816
2842
PK DECRYPT
SECURE NON-VOLATILE KEY STORAGE
2802
PPE 650

FIG. 66


PPE 650
SECURE NON-VOLATILE KEY STORAGE 2802
PRIV HDR KEY 2831
SECURE DB KEY 2817
ADMIN OBJECT (CONTROLS) 870
DECRYPT
PERC
ENCRYPT
2843
2844
PRIVATE BODY KEY FROM PERC 810
STATIONARY CONTENT OBJECT 850
DECRYPT
2845
SECURE DATABASE 610
CONTENT

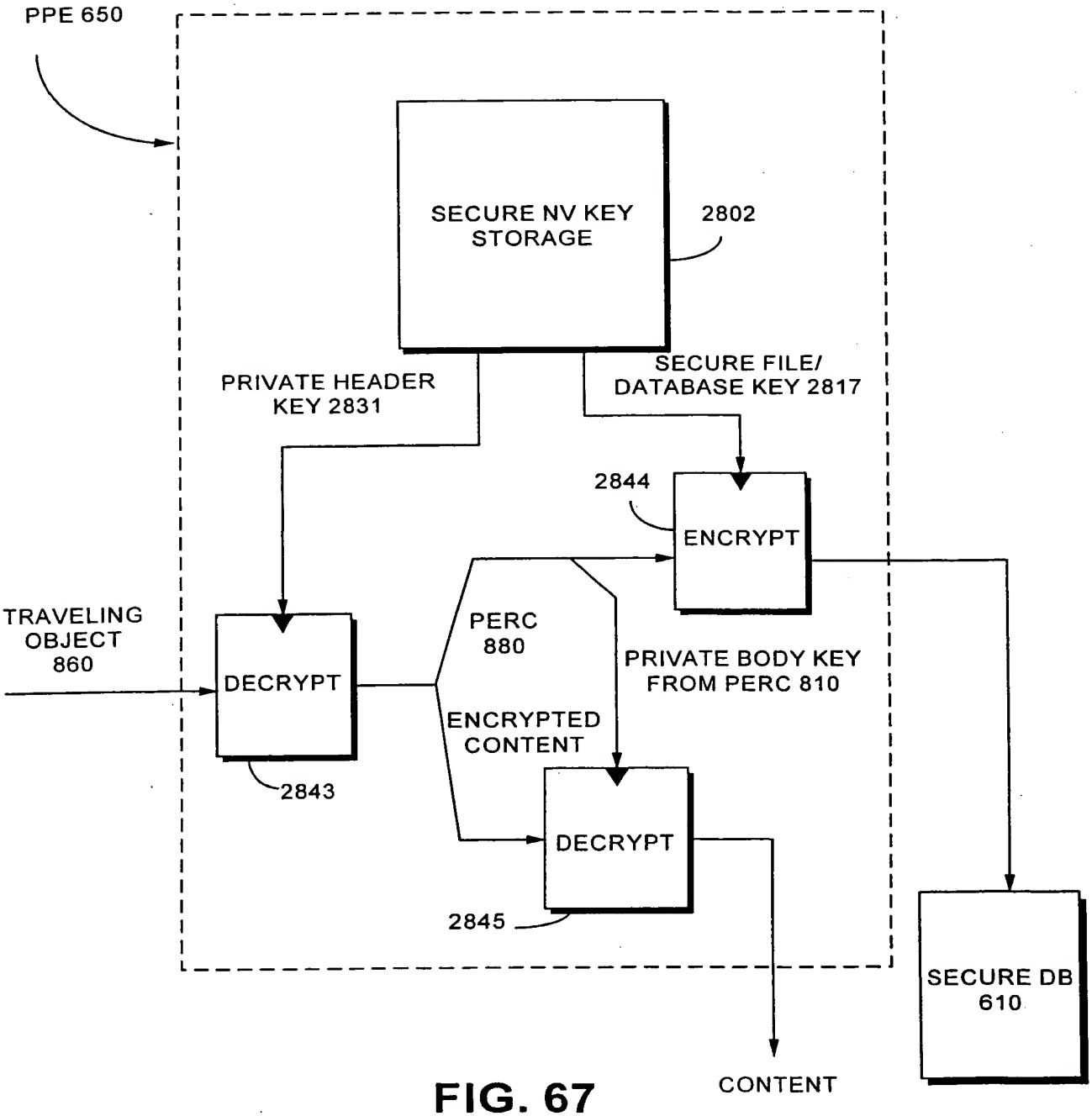

PPE 650
SECURE NV KEY STORAGE
2802
PRIVATE HEADER KEY 2831
SECURE FILE/ DATABASE KEY 2817
2844
ENCRYPT
TRAVELING OBJECT 860
DECRYPT
PERC 880
PRIVATE BODY KEY FROM PERC 810
ENCRYPTED CONTENT
2843
DECRYPT
2845
SECURE DB 610
CONTENT

FIG. 67

FIG. 68

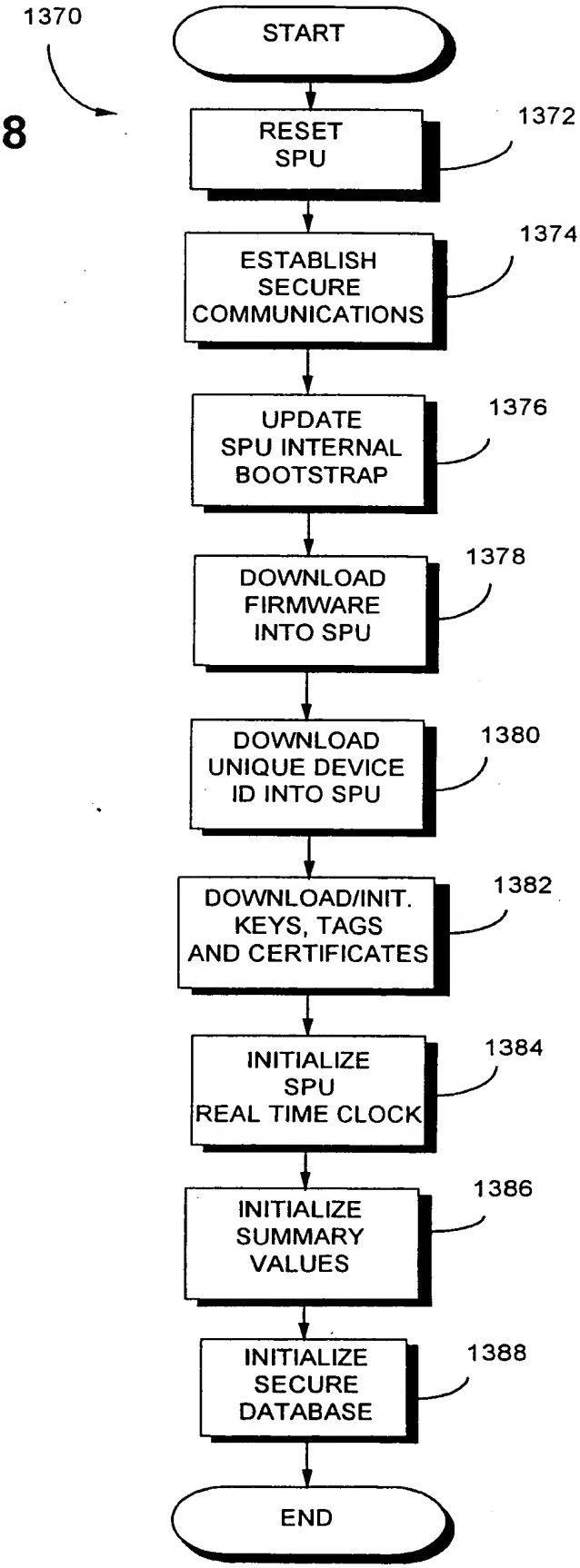
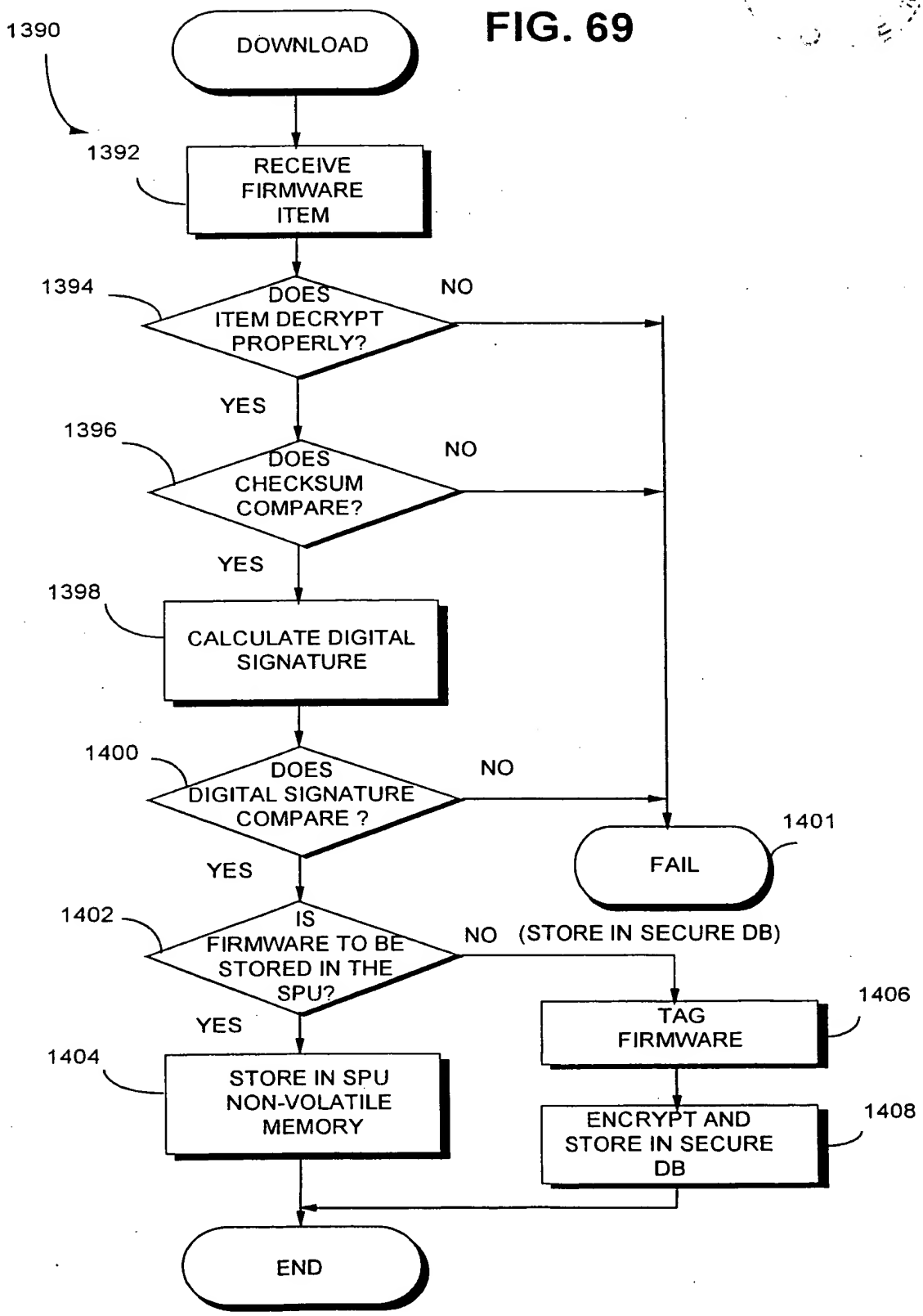

1370
START
RESET SPU
1372
ESTABLISH SECURE COMMUNICATIONS
1374
UPDATE SPU INTERNAL BOOTSTRAP
1376
DOWNLOAD FIRMWARE INTO SPU
1378
DOWNLOAD UNIQUE DEVICE ID INTO SPU
1380
DOWNLOAD/INIT. KEYS, TAGS AND CERTIFICATES
1382
INITIALIZE SPU REAL TIME CLOCK
1384
INITIALIZE SUMMARY VALUES
1386
INITIALIZE SECURE DATABASE
1388
END

FIG. 69


1390
DOWNLOAD
1392
RECEIVE FIRMWARE ITEM
1394
DOES ITEM DECRYPT PROPERLY?
NO
YES
1396
DOES CHECKSUM COMPARE?
NO
YES
1398
CALCULATE DIGITAL SIGNATURE
1400
DOES DIGITAL SIGNATURE COMPARE ?
NO
YES
1401
FAIL
1402
IS FIRMWARE TO BE STORED IN THE SPU?
NO (STORE IN SECURE DB)
YES
1404
STORE IN SPU NON-VOLATILE MEMORY
1406
TAG FIRMWARE
1408
ENCRYPT AND STORE IN SECURE DB
END

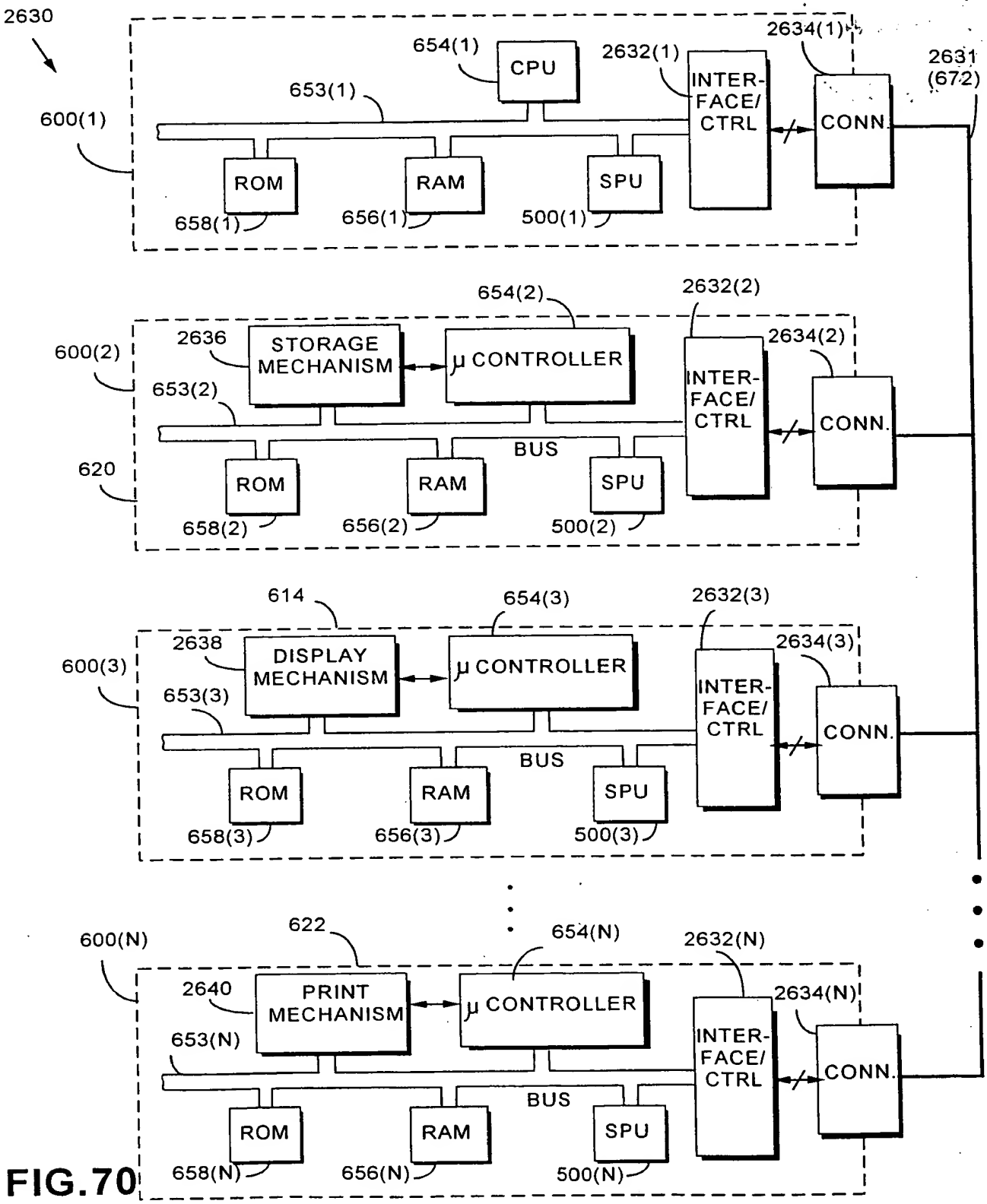
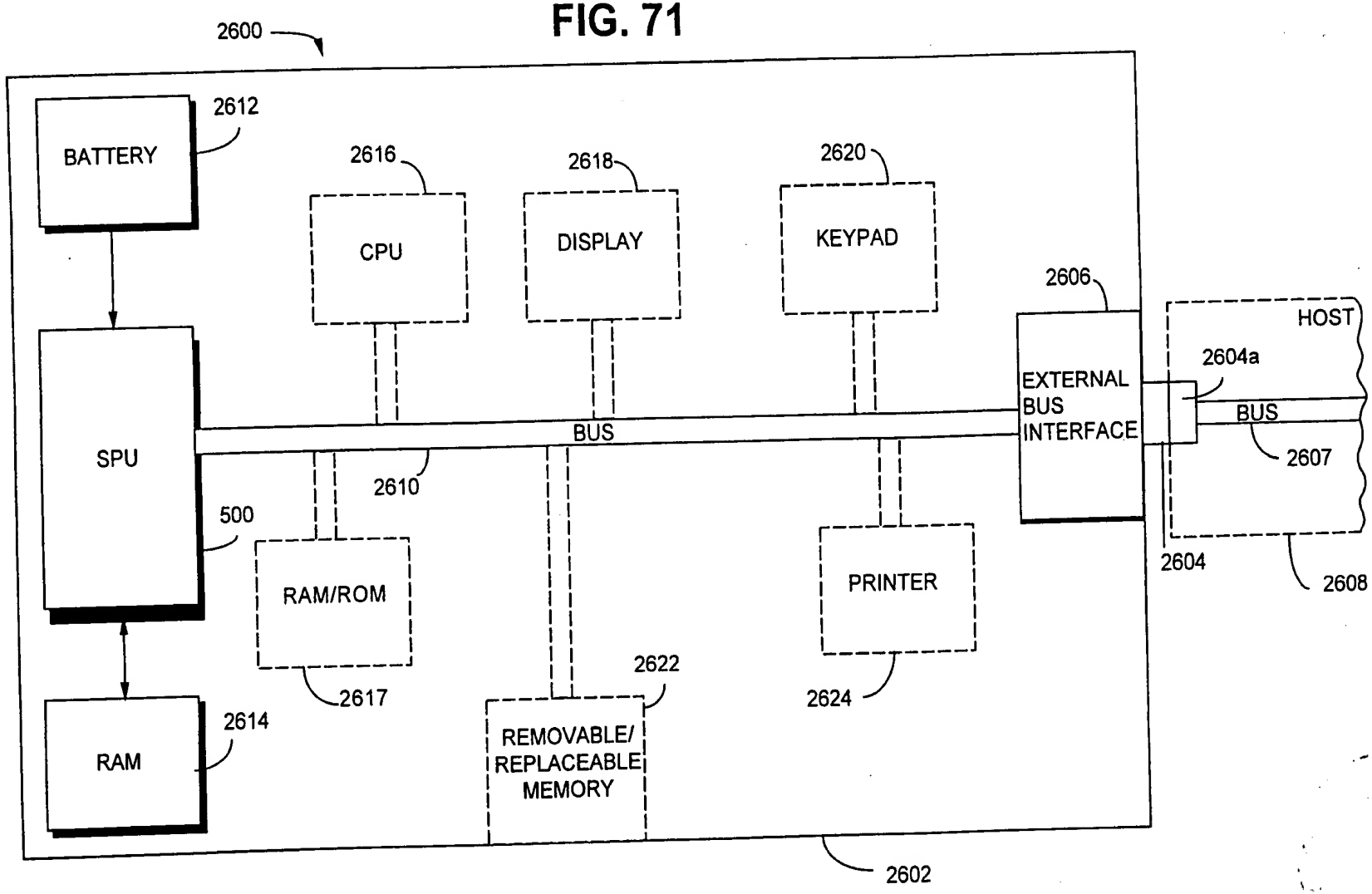

2630
600(1)
654(1)
CPU
653(1)
2632(1)
INTER-FACE/ CTRL
2634(1)
2631 (672)
CONN.
ROM
RAM
SPU
658(1)
656(1)
500(1)
600(2)
654(2)
2632(2)
2636
STORAGE MECHANISM
µ CONTROLLER
2634(2)
653(2)
BUS
620
658(2)
656(2)
500(2)
614
654(3)
2632(3)
600(3)
2638
DISPLAY MECHANISM
2634(3)
653(3)
658(3)
656(3)
500(3)
600(N)
622
654(N)
2632(N)
2640
PRINT MECHANISM
2634(N)
653(N)
658(N)
656(N)
500(N)

FIG.70

FIG. 71


2600
BATTERY
2612
2616
CPU
2618
DISPLAY
2620
KEYPAD
2606
HOST
2604a
EXTERNAL BUS INTERFACE
BUS
BUS
2607
SPU
500
2610
RAM/ROM
2617
PRINTER
2624
2604
2608
2622
REMOVABLE/ REPLACEABLE MEMORY
RAM
2614
2602

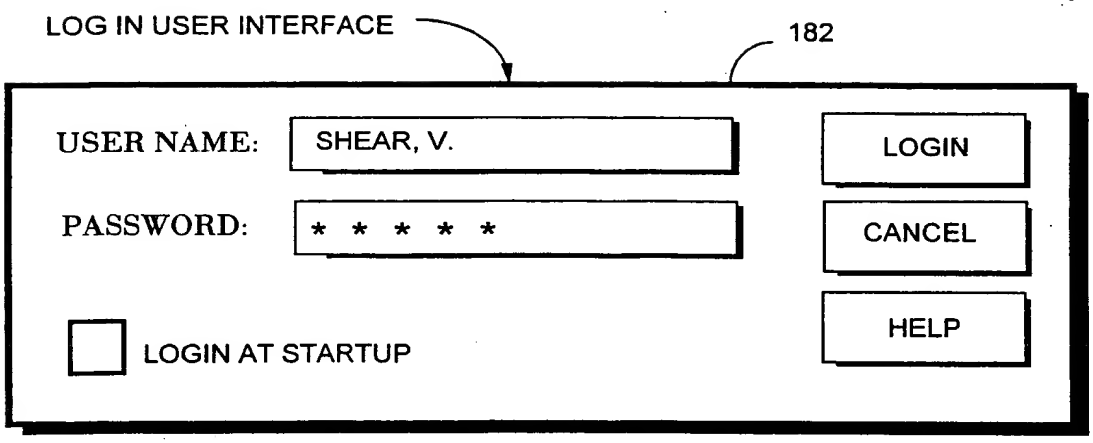


FIG. 72A

FIG. 72B

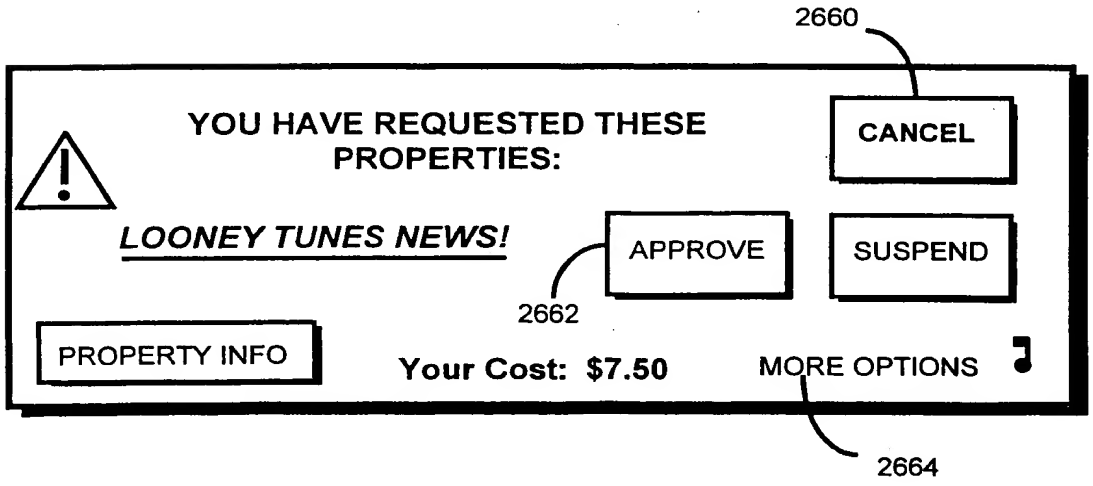


FIG. 72C

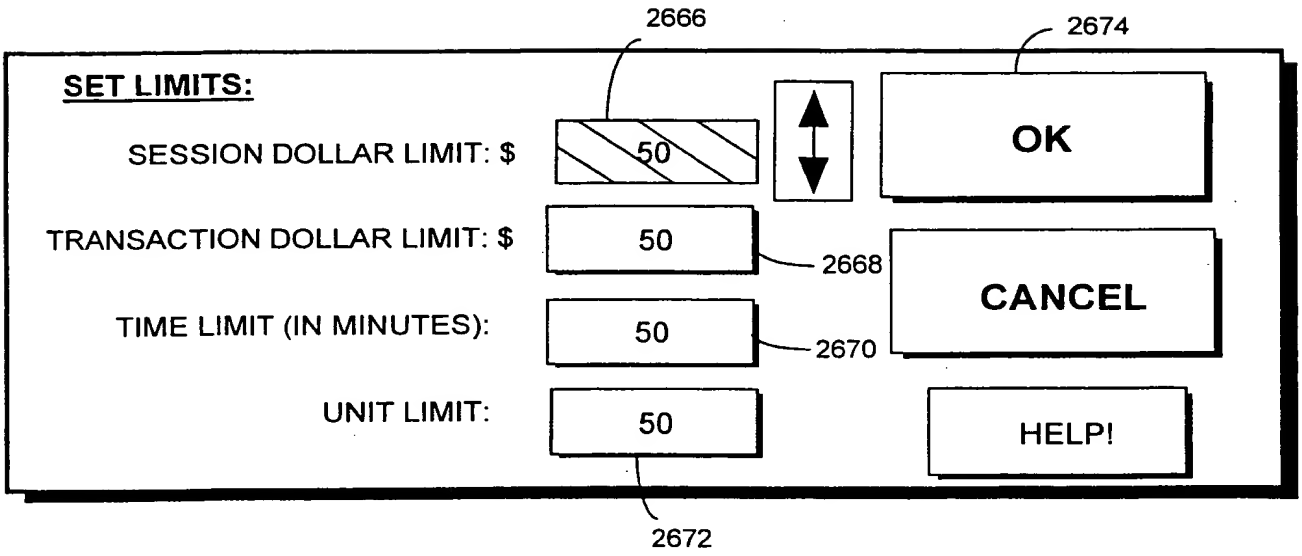

2666
2674
SET LIMITS:
SESSION DOLLAR LIMIT: $
50
OK
TRANSACTION DOLLAR LIMIT: $
50
2668
CANCEL
TIME LIMIT (IN MINUTES):
50
2670
UNIT LIMIT:
50
HELP!
2672

FIG. 72D

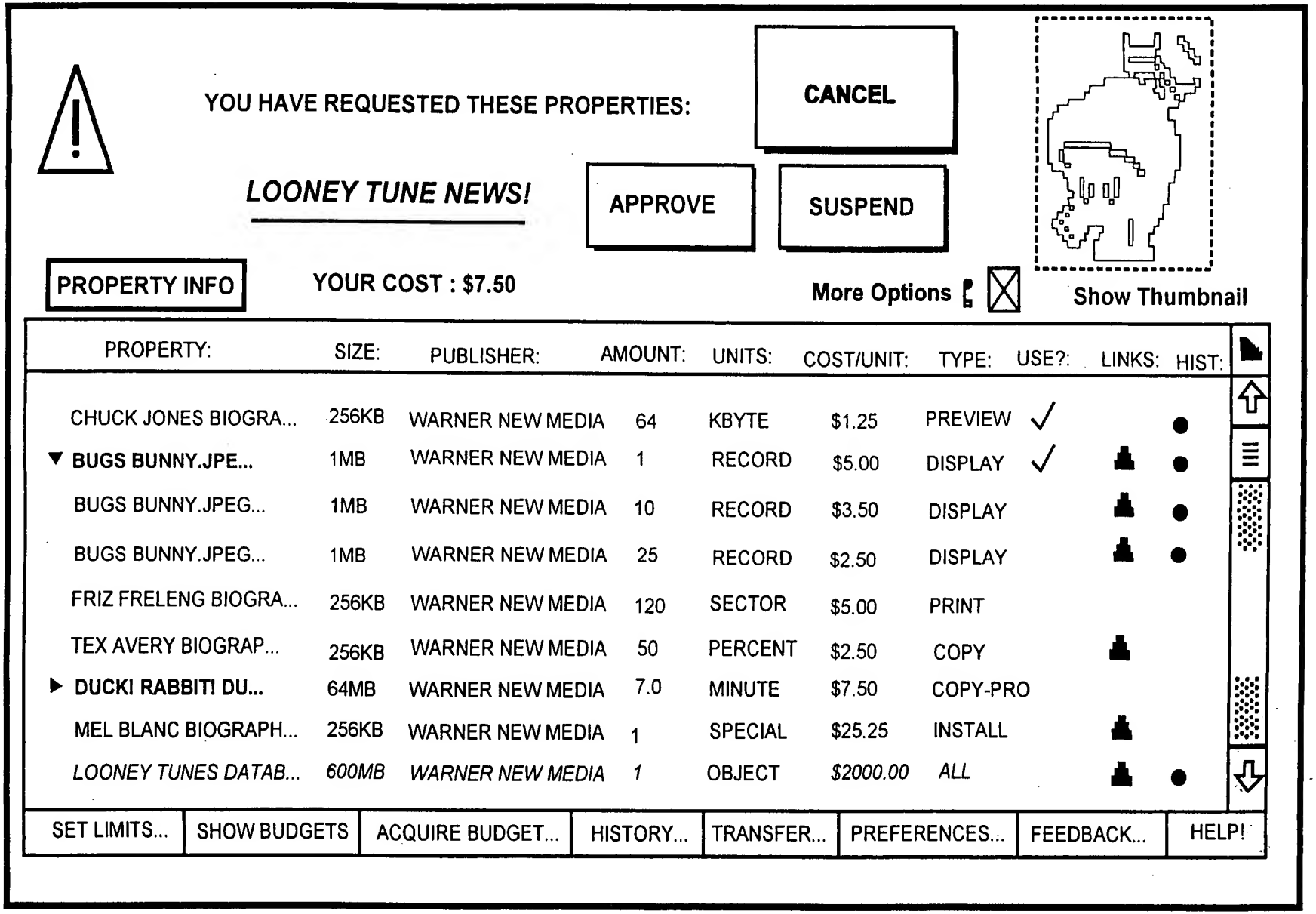

YOU HAVE REQUESTED THESE PROPERTIES:
CANCEL
LOONEY TUNE NEWS!
APPROVE
SUSPEND
PROPERTY INFO
YOUR COST : $7.50
More Options
Show Thumbnail
PROPERTY: SIZE: PUBLISHER: AMOUNT: UNITS: COST/UNIT: TYPE: USE?: LINKS: HIST:
CHUCK JONES BIOGRA... 256KB WARNER NEW MEDIA 64 KBYTE $1.25 PREVIEW
BUGS BUNNY.JPE... 1MB WARNER NEW MEDIA 1 RECORD $5.00 DISPLAY
BUGS BUNNY.JPEG... 1MB WARNER NEW MEDIA 10 RECORD $3.50 DISPLAY
BUGS BUNNY.JPEG... 1MB WARNER NEW MEDIA 25 RECORD $2.50 DISPLAY
FRIZ FRELENG BIOGRA... 256KB WARNER NEW MEDIA 120 SECTOR $5.00 PRINT
TEX AVERY BIOGRAP... 256KB WARNER NEW MEDIA 50 PERCENT $2.50 COPY
DUCK! RABBIT! DU... 64MB WARNER NEW MEDIA 7.0 MINUTE $7.50 COPY-PRO
MEL BLANC BIOGRAPH... 256KB WARNER NEW MEDIA 1 SPECIAL $25.25 INSTALL
LOONEY TUNES DATAB... 600MB WARNER NEW MEDIA 1 OBJECT $2000.00 ALL
SET LIMITS... SHOW BUDGETS ACQUIRE BUDGET... HISTORY... TRANSFER... PREFERENCES... FEEDBACK... HELP!

FIG. 73

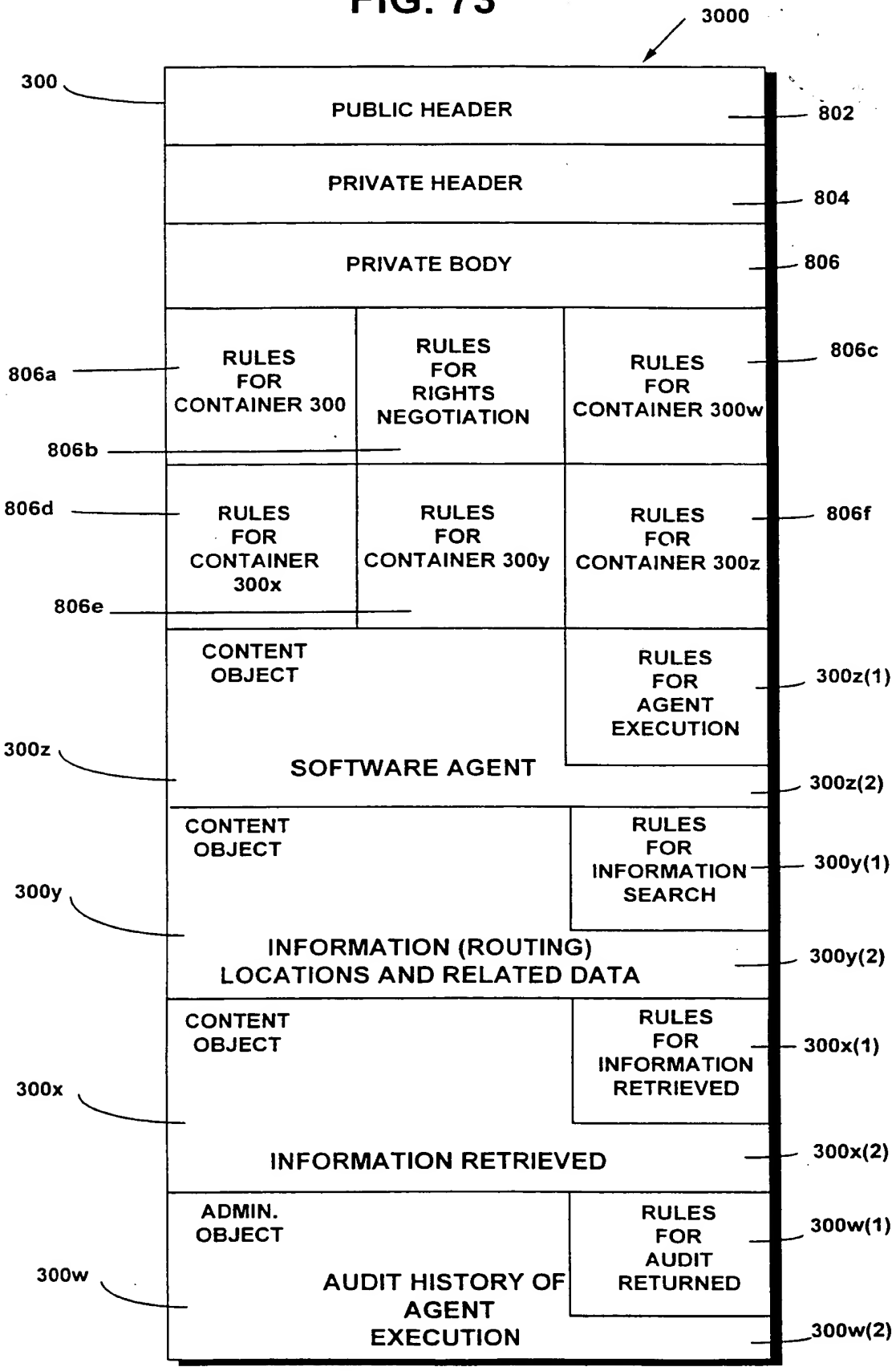

3000
300
PUBLIC HEADER
802
PRIVATE HEADER
804
PRIVATE BODY
806
RULES FOR CONTAINER 300
RULES FOR RIGHTS NEGOTIATION
RULES FOR CONTAINER 300w
806a
806b
806c
RULES FOR CONTAINER 300x
RULES FOR CONTAINER 300y
RULES FOR CONTAINER 300z
806d
806e
806f
CONTENT OBJECT
RULES FOR AGENT EXECUTION
300z(1)
300z
SOFTWARE AGENT
300z(2)
CONTENT OBJECT
RULES FOR INFORMATION SEARCH
300y(1)
300y
INFORMATION (ROUTING) LOCATIONS AND RELATED DATA
300y(2)
CONTENT OBJECT
RULES FOR INFORMATION RETRIEVED
300x(1)
300x
INFORMATION RETRIEVED
300x(2)
ADMIN. OBJECT
RULES FOR AUDIT RETURNED
300w(1)
300w
AUDIT HISTORY OF AGENT EXECUTION
300w(2)

FIG. 74

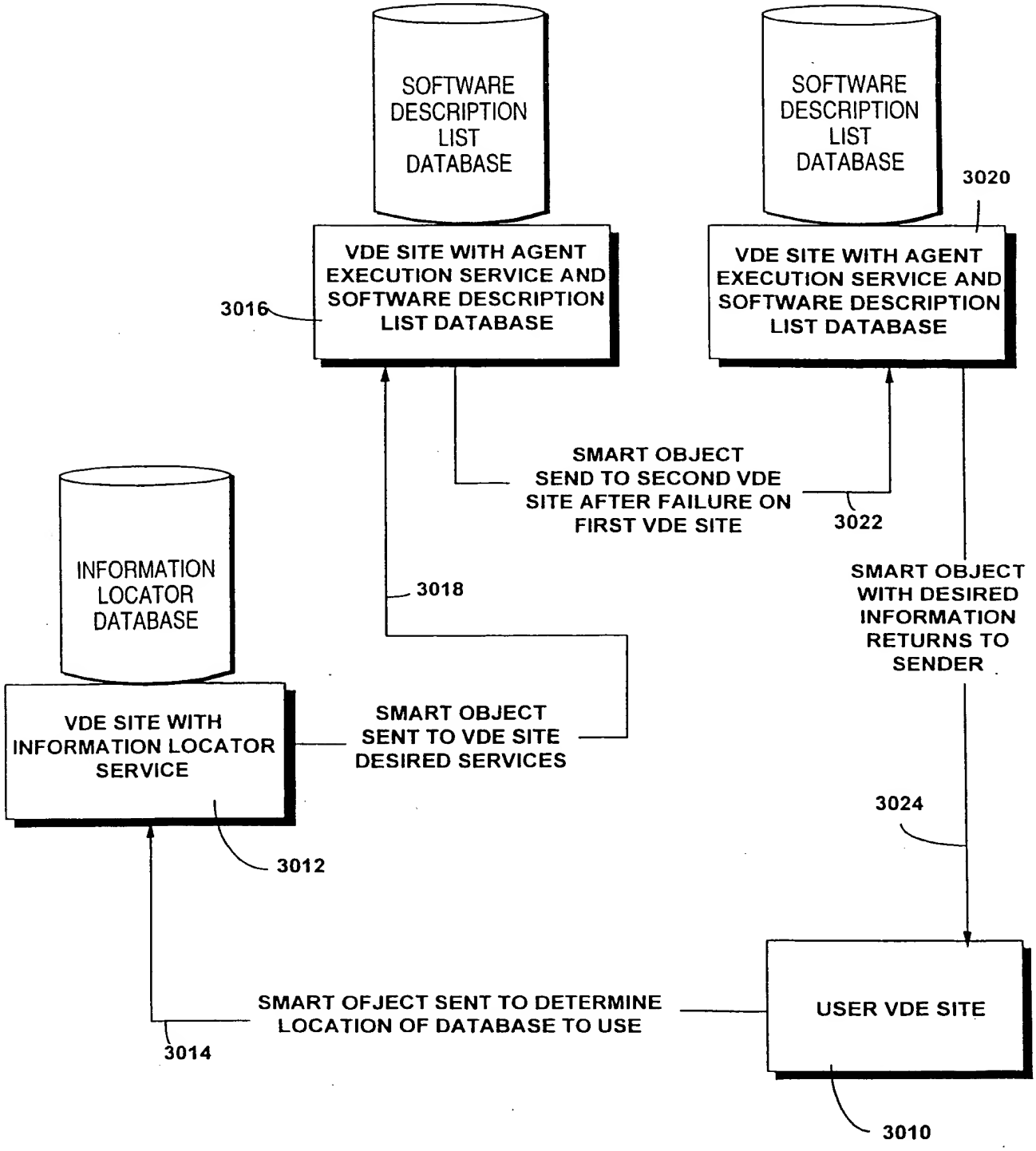

SOFTWARE DESCRIPTION LIST DATABASE
SOFTWARE DESCRIPTION LIST DATABASE
3020
VDE SITE WITH AGENT EXECUTION SERVICE AND SOFTWARE DESCRIPTION LIST DATABASE
3016
VDE SITE WITH AGENT EXECUTION SERVICE AND SOFTWARE DESCRIPTION LIST DATABASE
SMART OBJECT SEND TO SECOND VDE SITE AFTER FAILURE ON FIRST VDE SITE
3022
INFORMATION LOCATOR DATABASE
3018
SMART OBJECT WITH DESIRED INFORMATION RETURNS TO SENDER
VDE SITE WITH INFORMATION LOCATOR SERVICE
SMART OBJECT SENT TO VDE SITE DESIRED SERVICES
3024
3012
SMART OFJECT SENT TO DETERMINE LOCATION OF DATABASE TO USE
USER VDE SITE
3014
3010

FIG. 75A

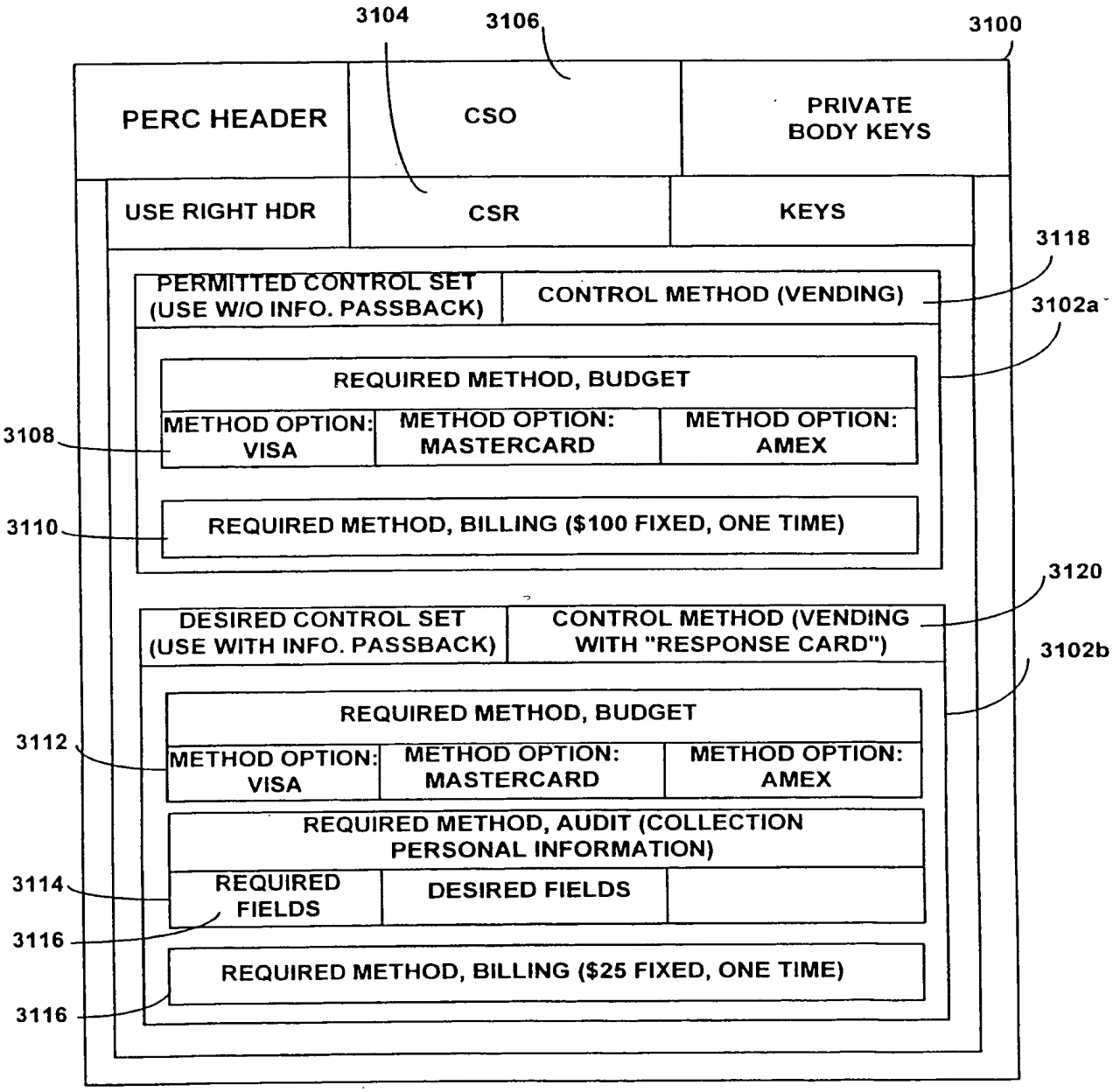

3104
3106
3100
PERC HEADER
CSO
PRIVATE BODY KEYS
USE RIGHT HDR
CSR
KEYS
3118
PERMITTED CONTROL SET (USE W/O INFO. PASSBACK)
CONTROL METHOD (VENDING)
3102a
REQUIRED METHOD, BUDGET
3108
METHOD OPTION: VISA
METHOD OPTION: MASTERCARD
METHOD OPTION: AMEX
3110
REQUIRED METHOD, BILLING ($100 FIXED, ONE TIME)
3120
DESIRED CONTROL SET (USE WITH INFO. PASSBACK)
CONTROL METHOD (VENDING WITH "RESPONSE CARD")
3102b
REQUIRED METHOD, BUDGET
3112
METHOD OPTION: VISA
METHOD OPTION: MASTERCARD
METHOD OPTION: AMEX
REQUIRED METHOD, AUDIT (COLLECTION PERSONAL INFORMATION)
3114
REQUIRED FIELDS
DESIRED FIELDS
3116
REQUIRED METHOD, BILLING ($25 FIXED, ONE TIME)
3116

FIG. 75B

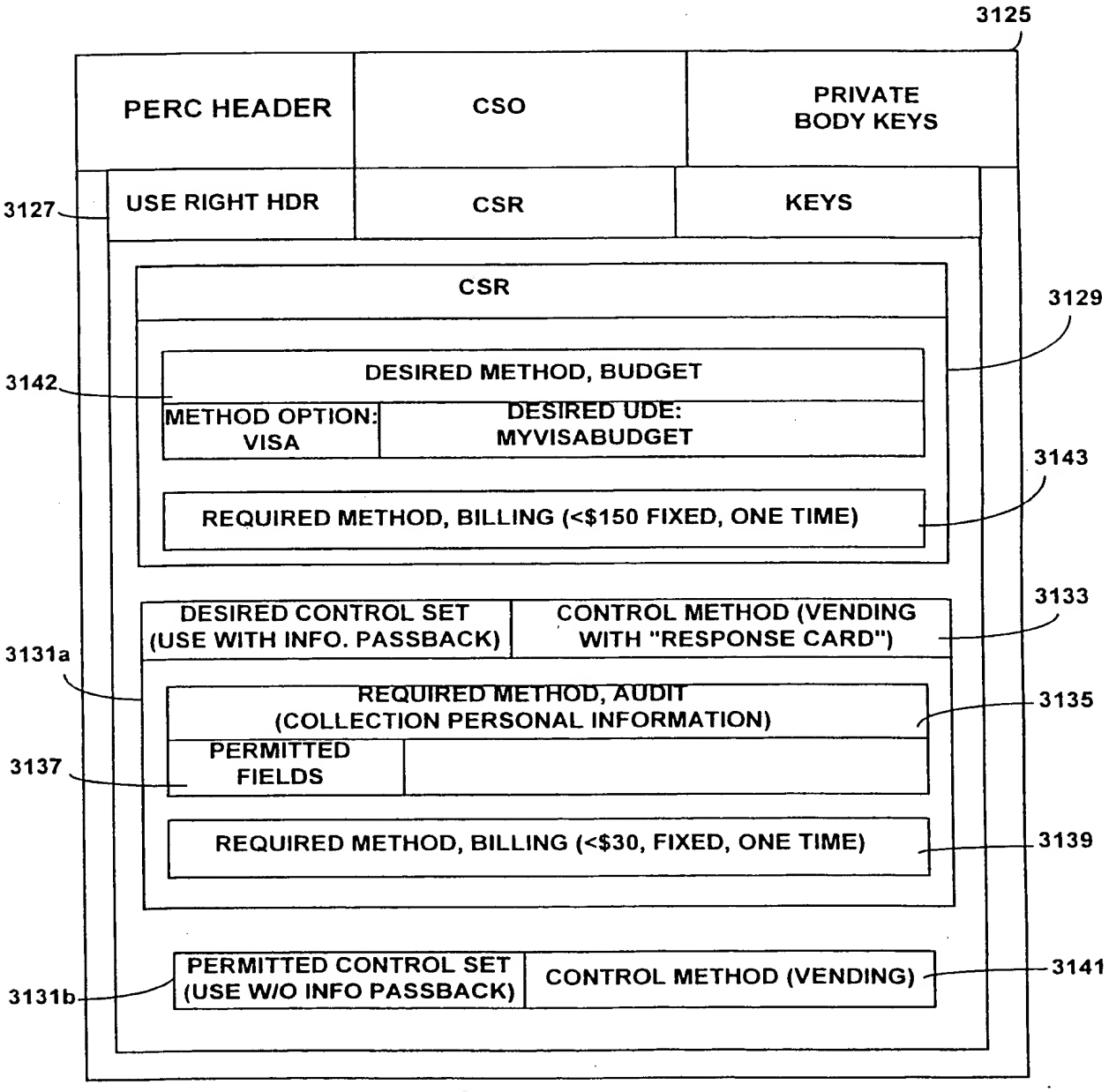

3125
PERC HEADER
CSO
PRIVATE BODY KEYS
3127
USE RIGHT HDR
CSR
KEYS
CSR
3129
DESIRED METHOD, BUDGET
3142
METHOD OPTION: VISA
DESIRED UDE: MYVISABUDGET
3143
REQUIRED METHOD, BILLING (<$150 FIXED, ONE TIME)
DESIRED CONTROL SET (USE WITH INFO. PASSBACK)
CONTROL METHOD (VENDING WITH "RESPONSE CARD")
3133
3131a
REQUIRED METHOD, AUDIT (COLLECTION PERSONAL INFORMATION)
3135
PERMITTED FIELDS
3137
REQUIRED METHOD, BILLING (<$30, FIXED, ONE TIME)
3139
PERMITTED CONTROL SET (USE W/O INFO PASSBACK)
CONTROL METHOD (VENDING)
3141
3131b

FIG. 75C

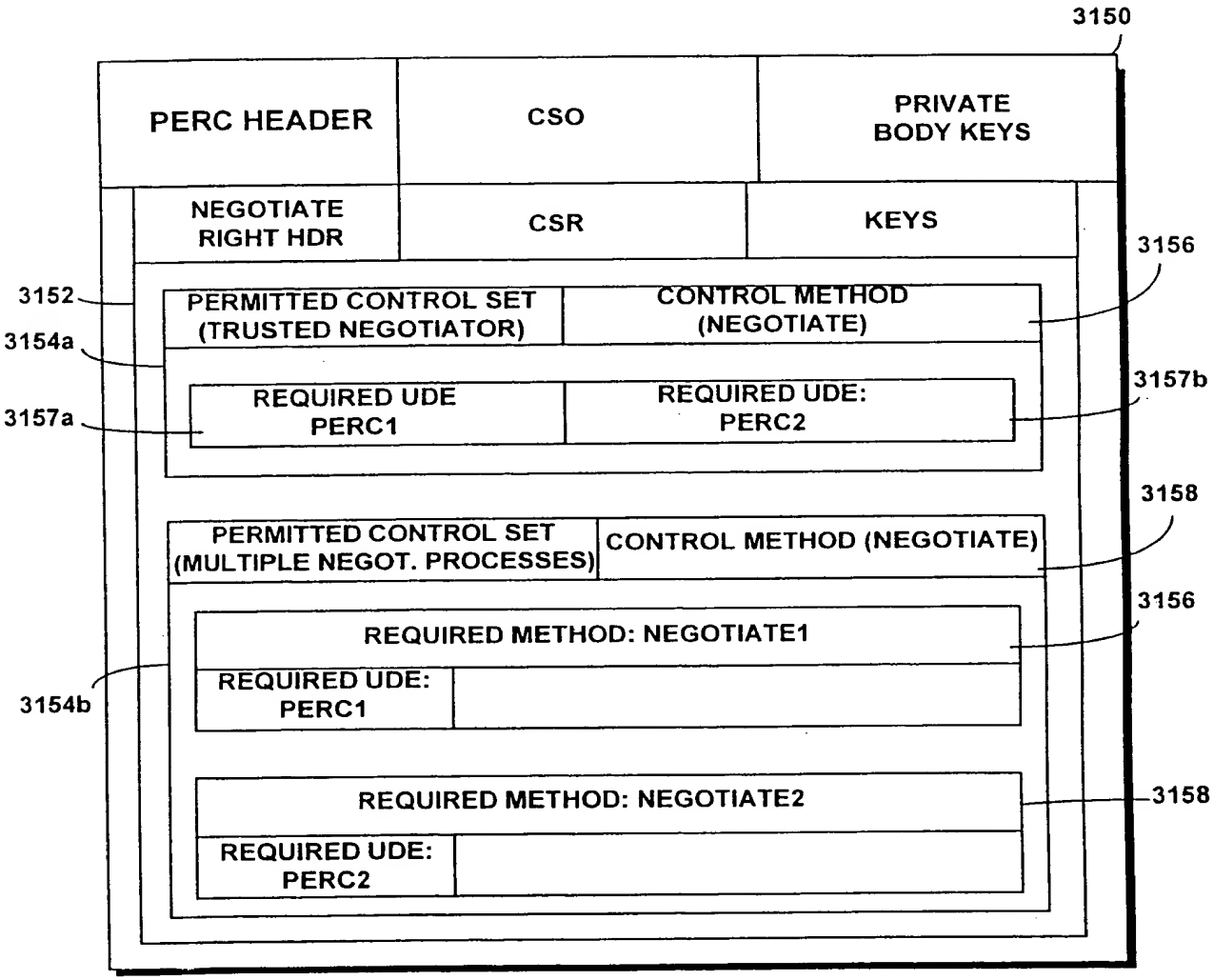
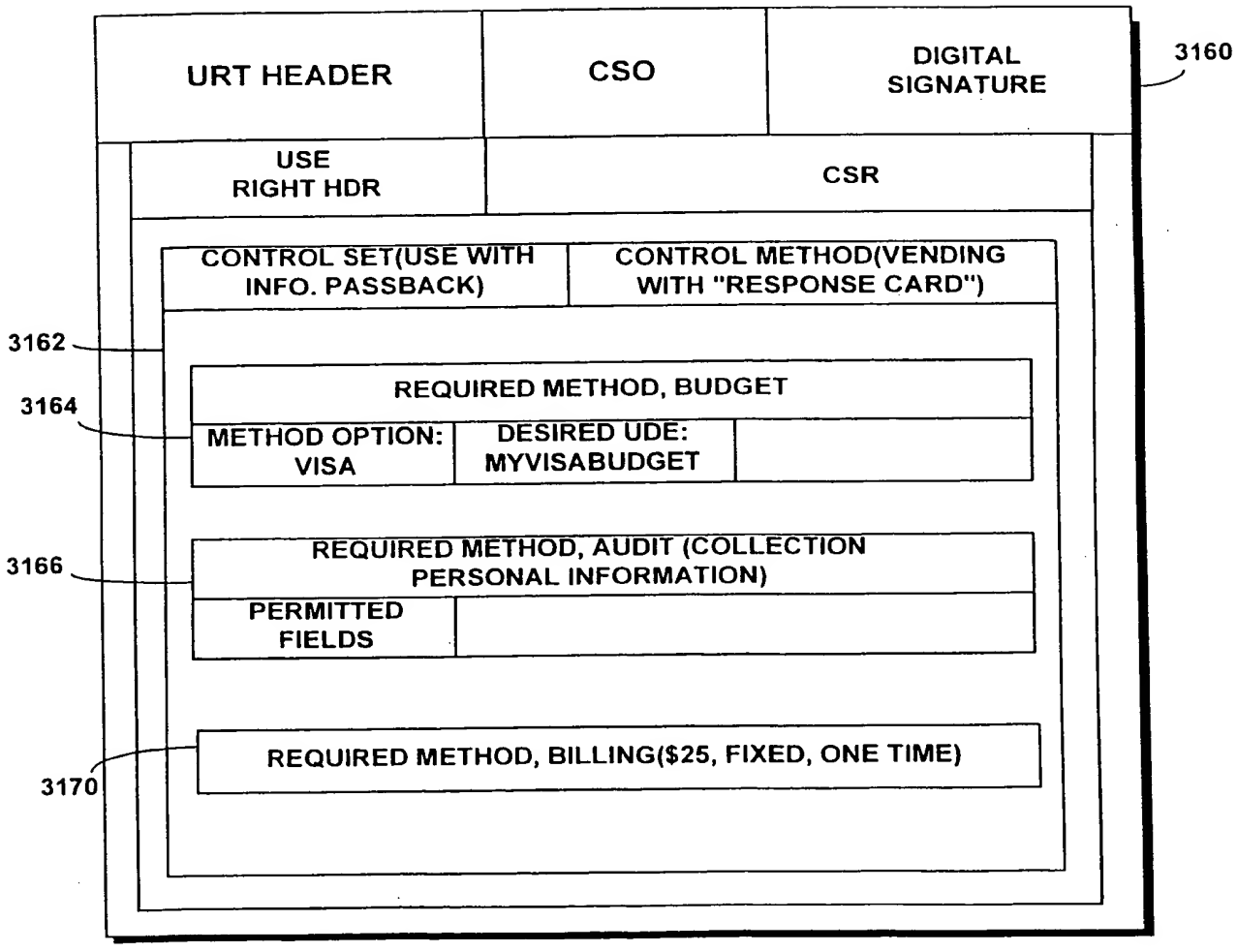

3150
PERC HEADER
CSO
PRIVATE BODY KEYS
NEGOTIATE RIGHT HDR
CSR
KEYS
3156
3152
PERMITTED CONTROL SET (TRUSTED NEGOTIATOR)
CONTROL METHOD (NEGOTIATE)
3154a
3157b
3157a
REQUIRED UDE PERC1
REQUIRED UDE: PERC2
3158
PERMITTED CONTROL SET (MULTIPLE NEGOT. PROCESSES)
CONTROL METHOD (NEGOTIATE)
3156
REQUIRED METHOD: NEGOTIATE1
3154b
REQUIRED UDE: PERC1
REQUIRED METHOD: NEGOTIATE2
3158
REQUIRED UDE: PERC2

FIG. 75D


URT HEADER
CSO
DIGITAL SIGNATURE
3160
USE RIGHT HDR
CSR
CONTROL SET(USE WITH INFO. PASSBACK)
CONTROL METHOD(VENDING WITH "RESPONSE CARD")
3162
REQUIRED METHOD, BUDGET
3164
METHOD OPTION: VISA
DESIRED UDE: MYVISABUDGET
REQUIRED METHOD, AUDIT (COLLECTION PERSONAL INFORMATION)
3166
PERMITTED FIELDS
REQUIRED METHOD, BILLING($25, FIXED, ONE TIME)
3170

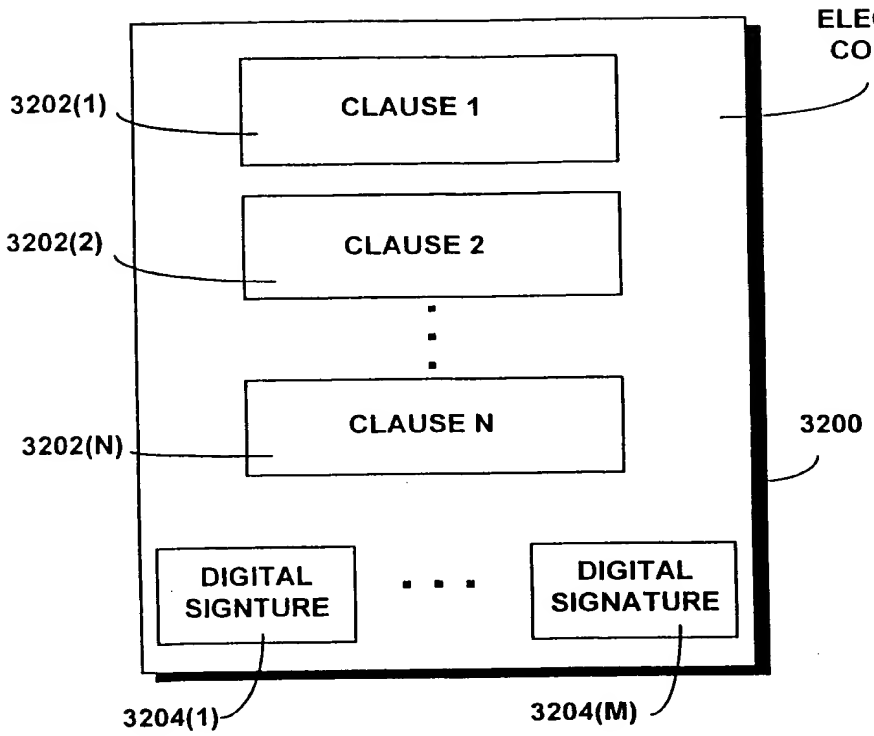


FIG. 75E

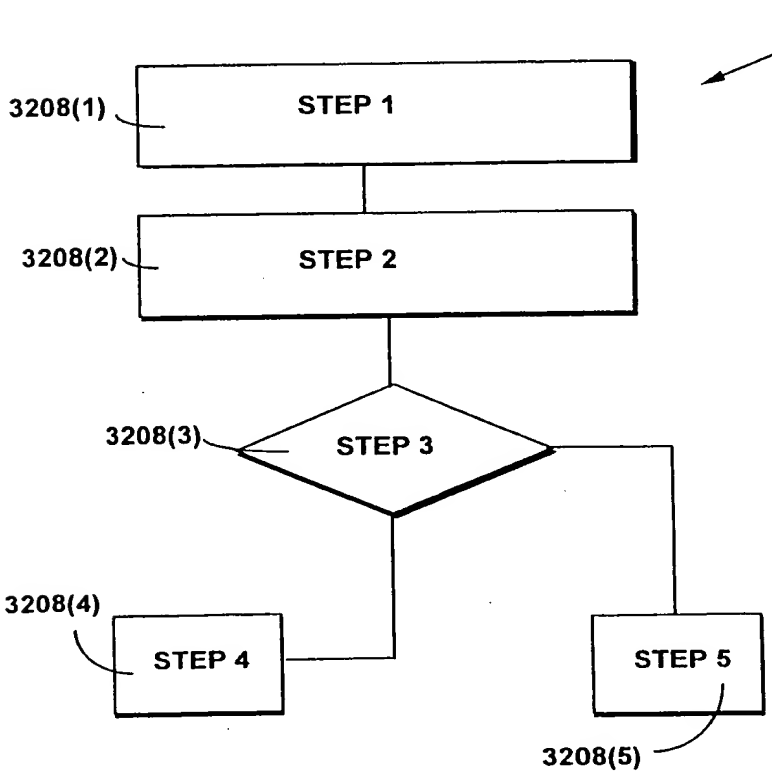


FIG. 75F

FIG. 76A

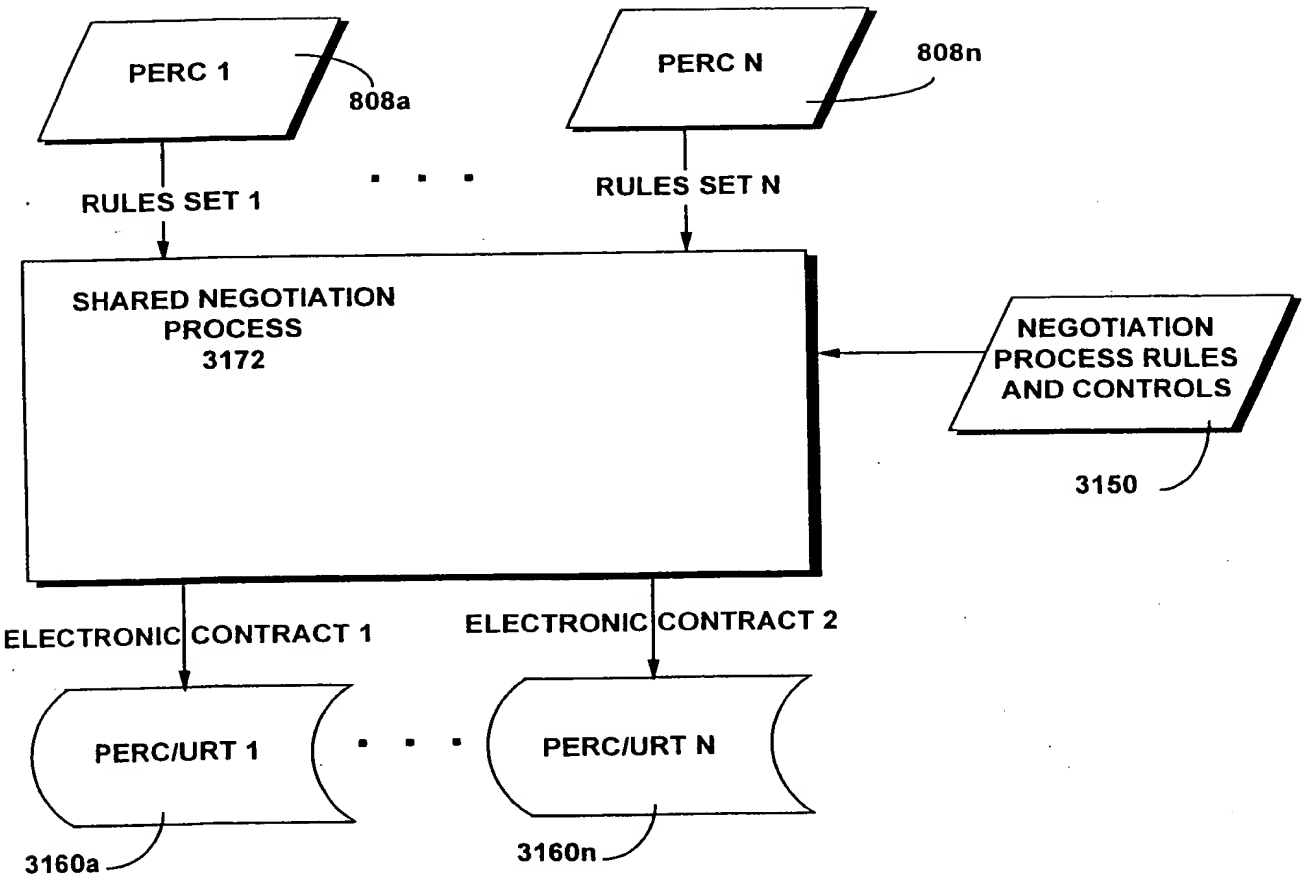

PERC 1
808a
PERC N
808n
RULES SET 1
RULES SET N
SHARED NEGOTIATION PROCESS 3172
NEGOTIATION PROCESS RULES AND CONTROLS
3150
ELECTRONIC CONTRACT 1
ELECTRONIC CONTRACT 2
PERC/URT 1
PERC/URT N
3160a
3160n

FIG. 76B

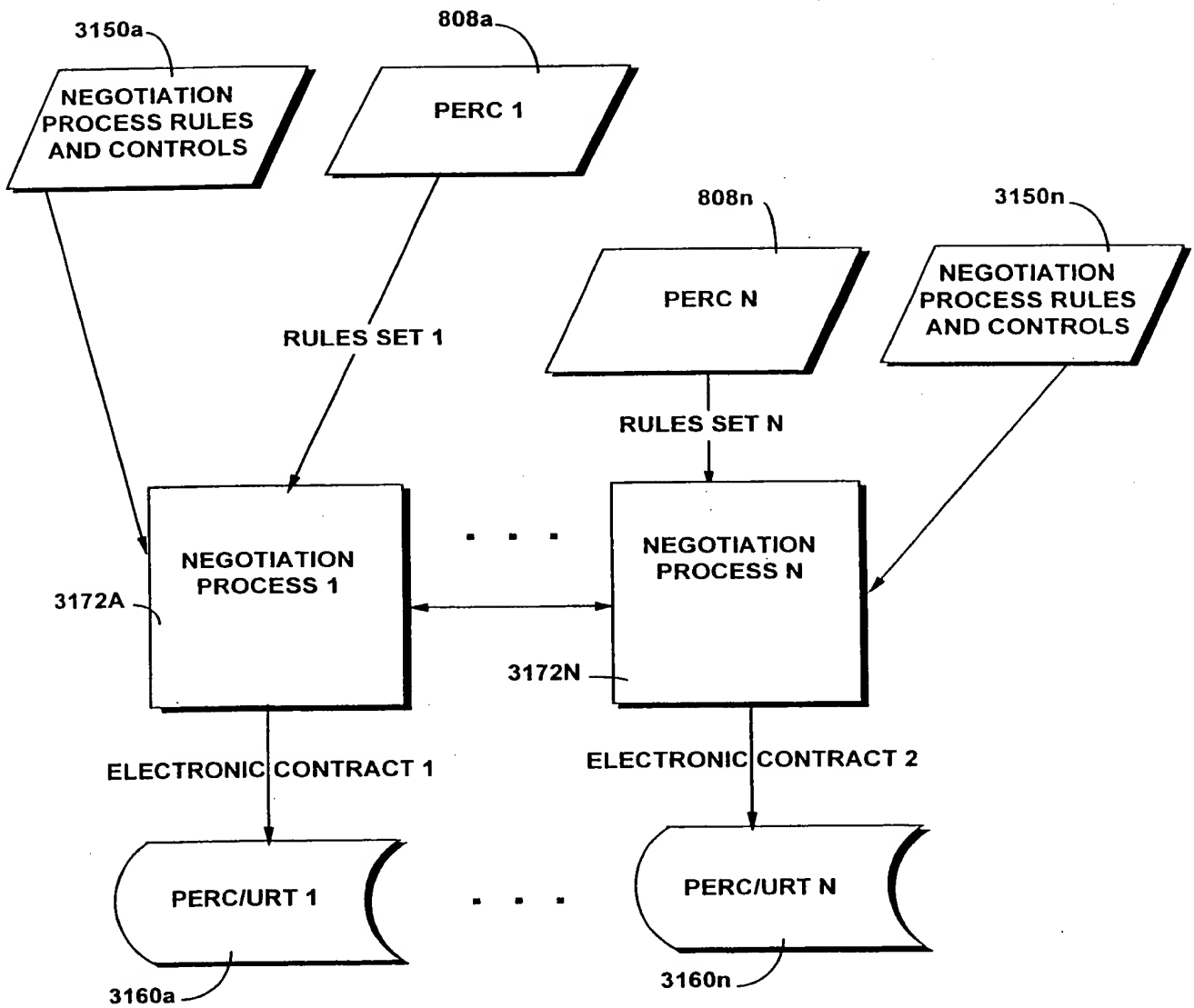
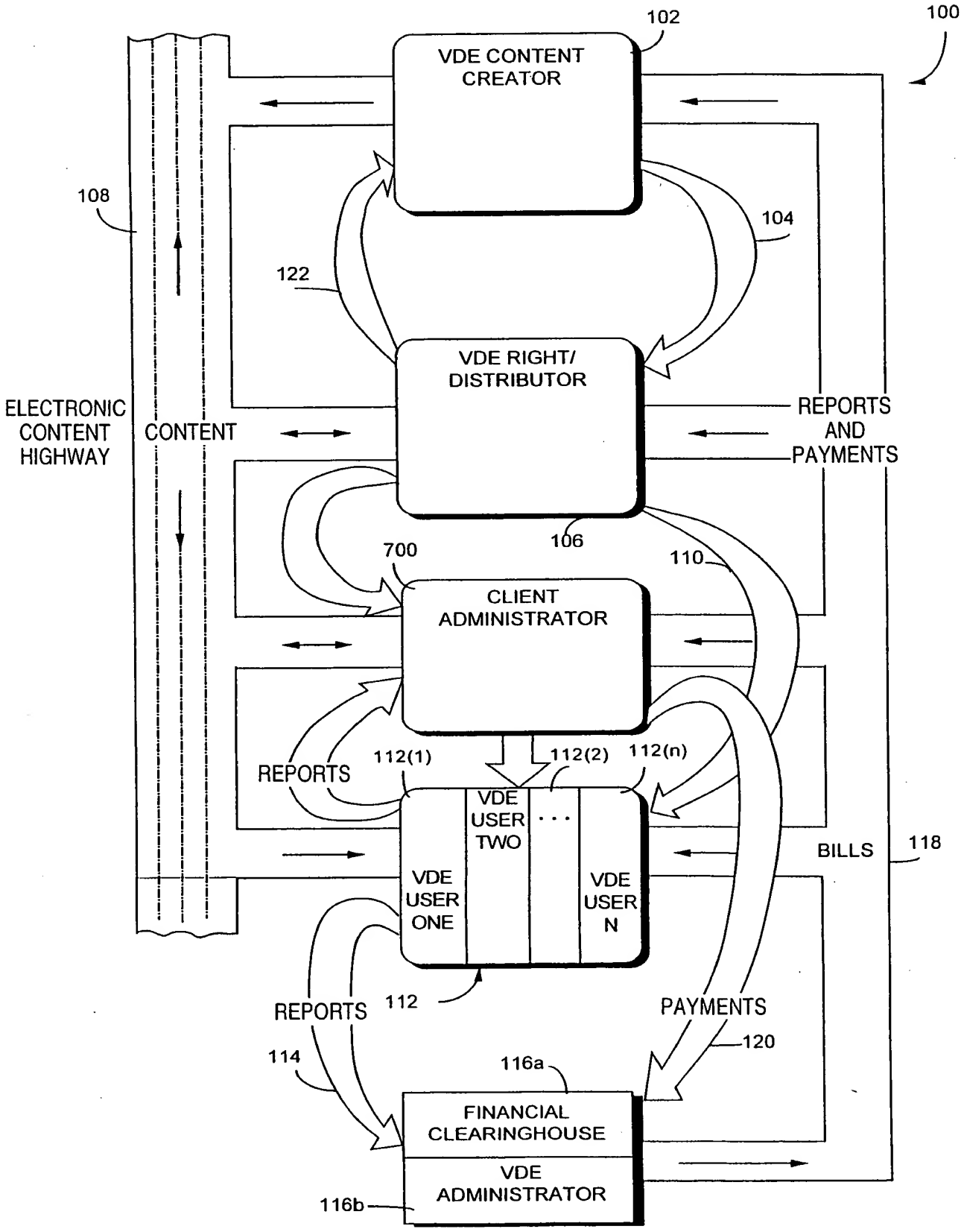

3150a
NEGOTIATION PROCESS RULES AND CONTROLS
808a
PERC 1
808n
PERC N
3150n
NEGOTIATION PROCESS RULES AND CONTROLS
RULES SET 1
RULES SET N
NEGOTIATION PROCESS 1
3172A
NEGOTIATION PROCESS N
3172N
ELECTRONIC CONTRACT 1
ELECTRONIC CONTRACT 2
PERC/URT 1
PERC/URT N
3160a
3160n

FIG. 77


100
102
VDE CONTENT CREATOR
108
104
122
VDE RIGHT/ DISTRIBUTOR
ELECTRONIC CONTENT HIGHWAY
CONTENT
REPORTS AND PAYMENTS
700
106
110
CLIENT ADMINISTRATOR
REPORTS
112(1)
112(2)
112(n)
VDE USER TWO
VDE USER ONE
VDE USER N
BILLS
118
112
REPORTS
PAYMENTS
120
114
116a
FINANCIAL CLEARINGHOUSE
VDE ADMINISTRATOR
116b

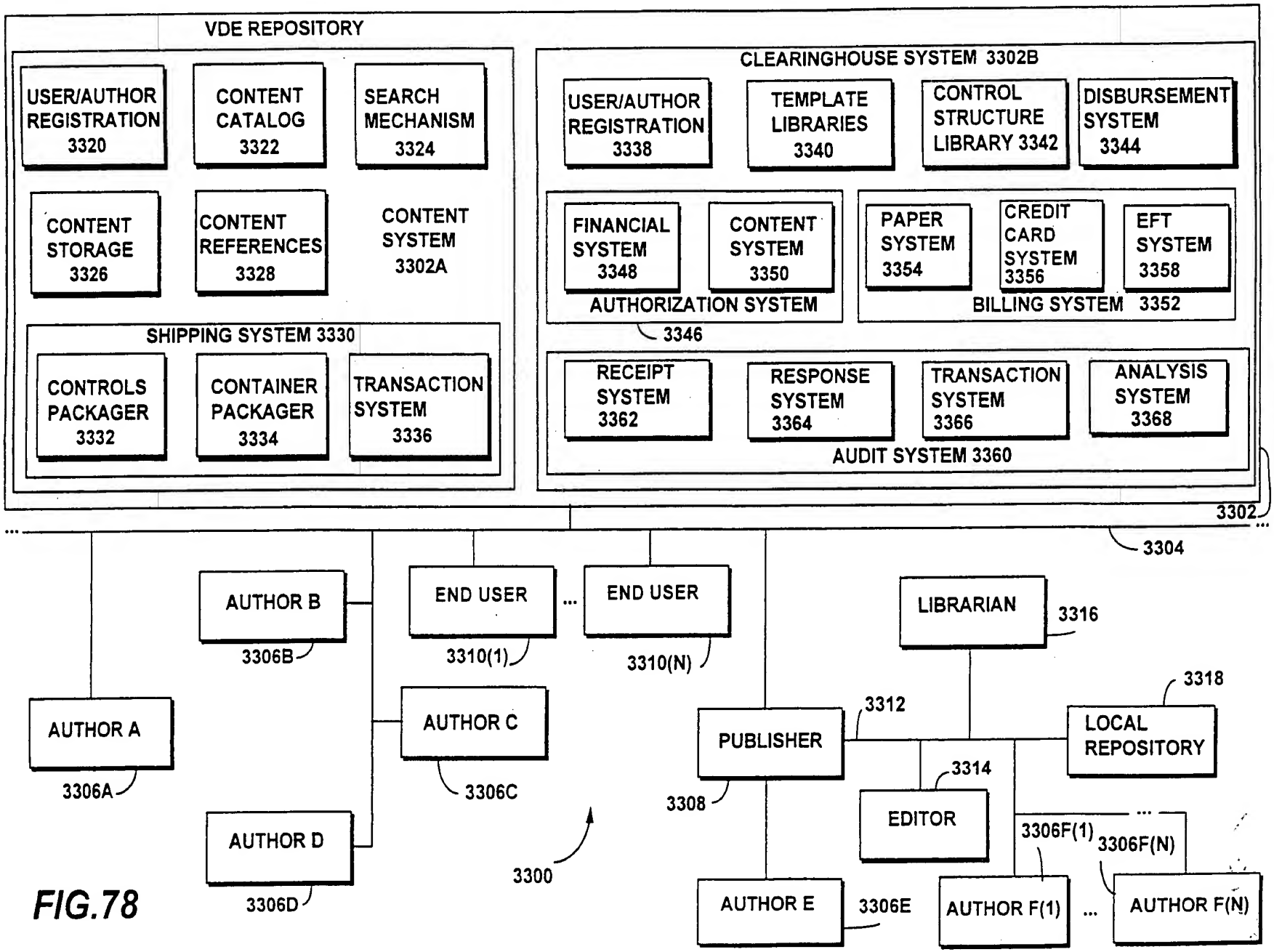

VDE REPOSITORY
USER/AUTHOR REGISTRATION 3320
CONTENT CATALOG 3322
SEARCH MECHANISM 3324
CONTENT STORAGE 3326
CONTENT REFERENCES 3328
CONTENT SYSTEM 3302A
SHIPPING SYSTEM 3330
CONTROLS PACKAGER 3332
CONTAINER PACKAGER 3334
TRANSACTION SYSTEM 3336
CLEARINGHOUSE SYSTEM 3302B
USER/AUTHOR REGISTRATION 3338
TEMPLATE LIBRARIES 3340
CONTROL STRUCTURE LIBRARY 3342
DISBURSEMENT SYSTEM 3344
FINANCIAL SYSTEM 3348
CONTENT SYSTEM 3350
AUTHORIZATION SYSTEM
3346
PAPER SYSTEM 3354
CREDIT CARD SYSTEM 3356
EFT SYSTEM 3358
BILLING SYSTEM 3352
RECEIPT SYSTEM 3362
RESPONSE SYSTEM 3364
TRANSACTION SYSTEM 3366
ANALYSIS SYSTEM 3368
AUDIT SYSTEM 3360
3302
3304
AUTHOR A
3306A
AUTHOR B
3306B
AUTHOR C
3306C
AUTHOR D
3306D
END USER
3310(1)
END USER
3310(N)
3300
LIBRARIAN
3316
3318
PUBLISHER
3312
3308
LOCAL REPOSITORY
3314
EDITOR
3306F(1)
3306F(N)
AUTHOR E
3306E
AUTHOR F(1)
AUTHOR F(N)

FIG.78

FIG. 79

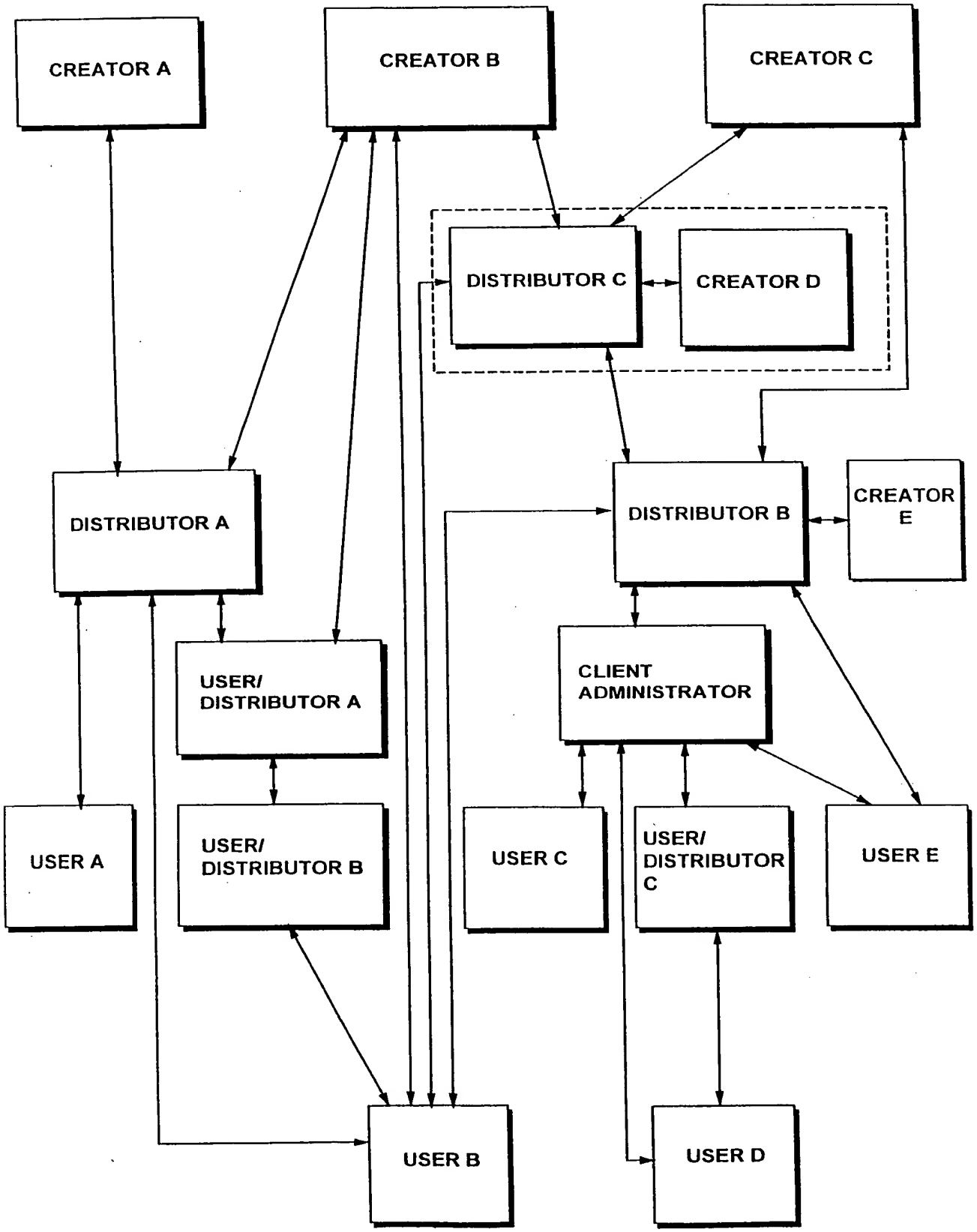

CREATOR A
CREATOR B
CREATOR C
DISTRIBUTOR C
CREATOR D
DISTRIBUTOR A
DISTRIBUTOR B
CREATOR E
USER/ DISTRIBUTOR A
CLIENT ADMINISTRATOR
USER A
USER/ DISTRIBUTOR B
USER C
USER/ DISTRIBUTOR C
USER E
USER B
USER D

FIG. 80

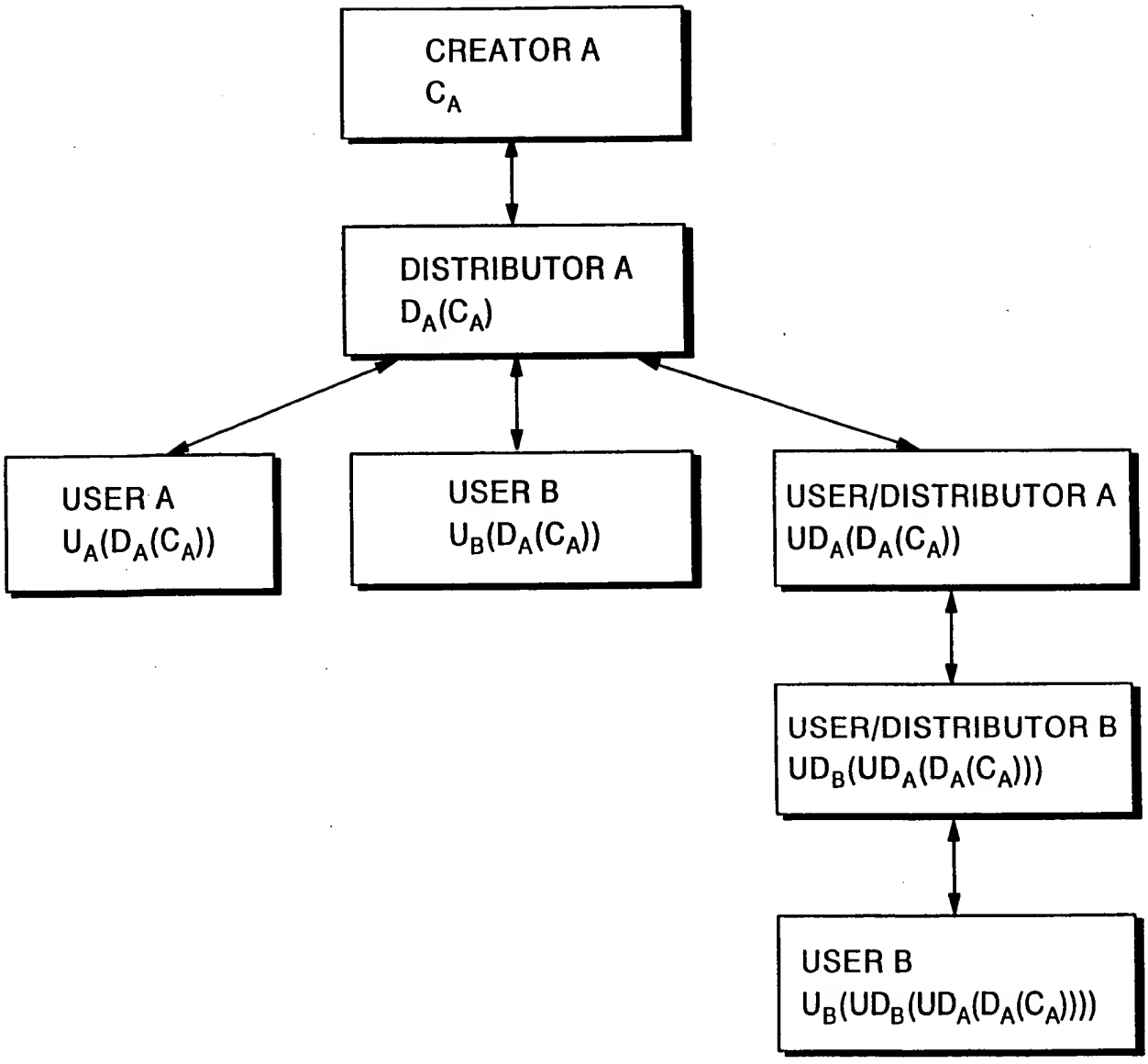

CREATOR A
C_A
DISTRIBUTOR A
$D_A(C_A)$
USER A
$U_A(D_A(C_A))$
USER B
$U_B(D_A(C_A))$
USER/DISTRIBUTOR A
$UD_A(D_A(C_A))$
USER/DISTRIBUTOR B
$UD_B(UD_A(D_A(C_A)))$
USER B
$U_B(UD_B(UD_A(D_A(C_A))))$

FIG. 81

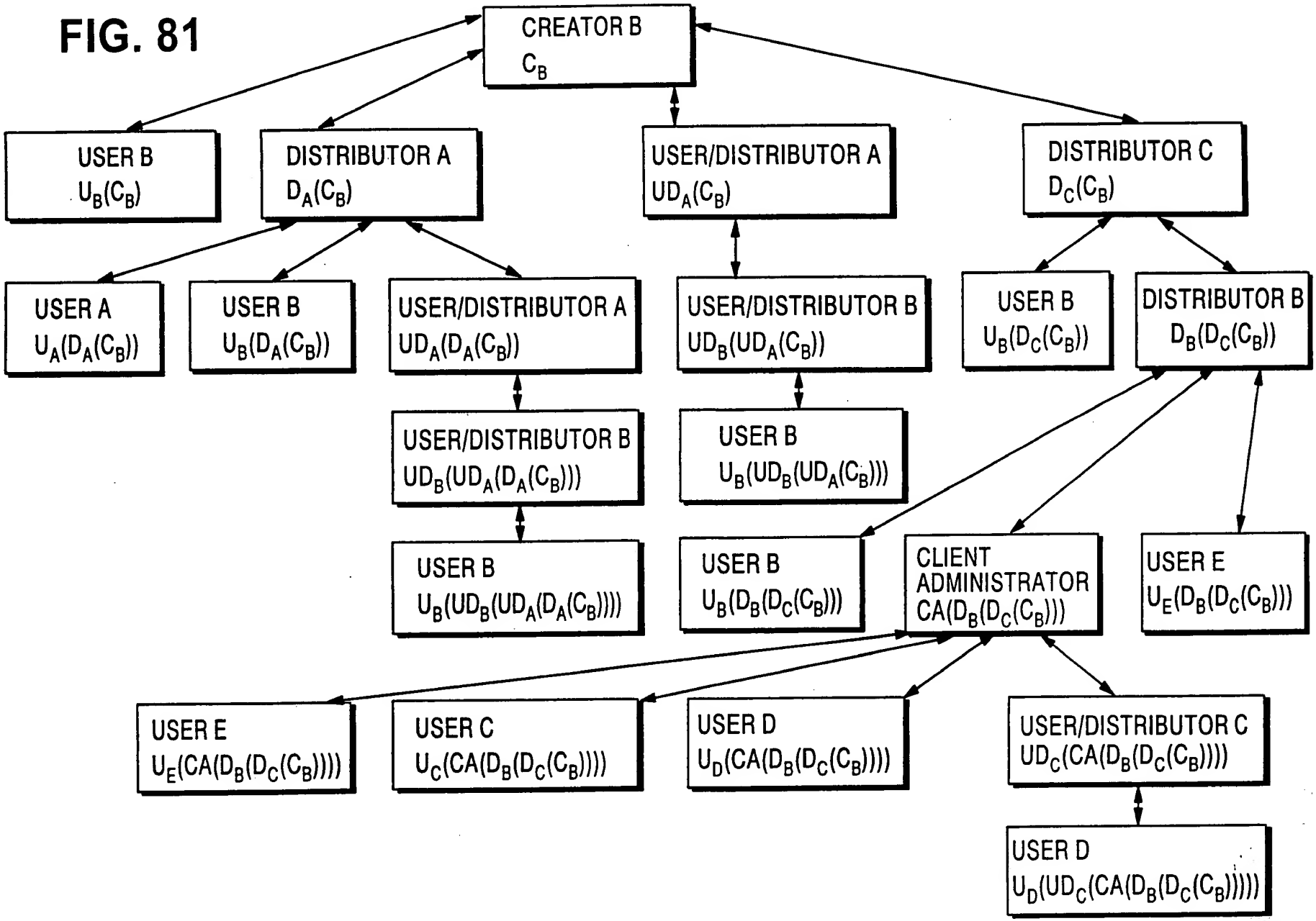

CREATOR B
C_B
USER B
$U_B(C_B)$
DISTRIBUTOR A
$D_A(C_B)$
USER/DISTRIBUTOR A
$UD_A(C_B)$
DISTRIBUTOR C
$D_C(C_B)$
USER A
$U_A(D_A(C_B))$
USER B
$U_B(D_A(C_B))$
USER/DISTRIBUTOR A
$UD_A(D_A(C_B))$
USER/DISTRIBUTOR B
$UD_B(UD_A(C_B))$
USER B
$U_B(D_C(C_B))$
DISTRIBUTOR B
$D_B(D_C(C_B))$
USER/DISTRIBUTOR B
$UD_B(UD_A(D_A(C_B)))$
USER B
$U_B(UD_B(UD_A(C_B)))$
USER B
$U_B(UD_B(UD_A(D_A(C_B))))$
USER B
$U_B(D_B(D_C(C_B)))$
CLIENT ADMINISTRATOR
$CA(D_B(D_C(C_B)))$
USER E
$U_E(D_B(D_C(C_B)))$
USER E
$U_E(CA(D_B(D_C(C_B))))$
USER C
$U_C(CA(D_B(D_C(C_B))))$
USER D
$U_D(CA(D_B(D_C(C_B))))$
USER/DISTRIBUTOR C
$UD_C(CA(D_B(D_C(C_B))))$
USER D
$U_D(UD_C(CA(D_B(D_C(C_B)))))$

FIG. 82

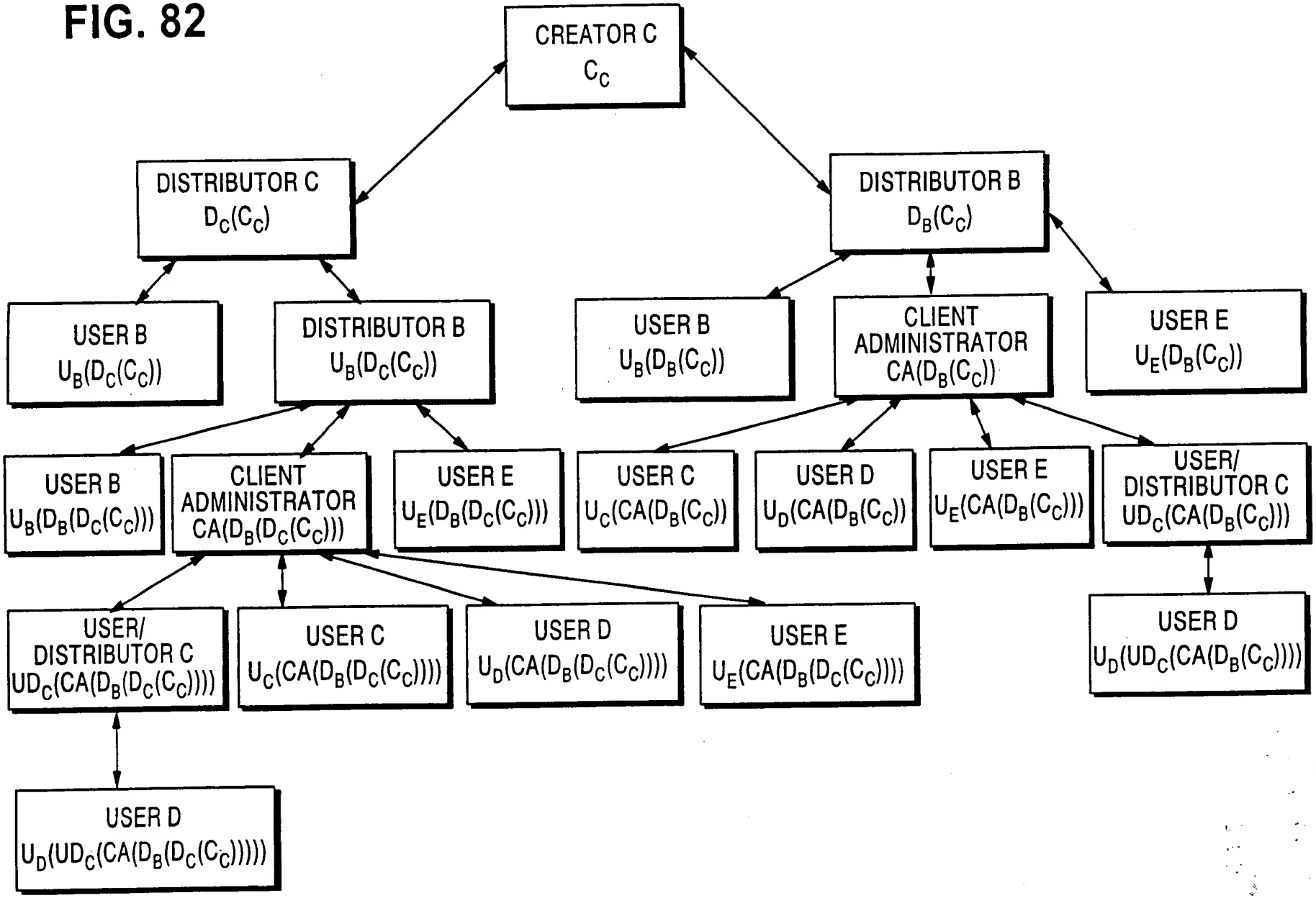

CREATOR C
C_C
DISTRIBUTOR C
$D_C(C_C)$
DISTRIBUTOR B
$D_B(C_C)$
USER B
$U_B(D_C(C_C))$
DISTRIBUTOR B
$U_B(D_C(C_C))$
USER B
$U_B(D_B(C_C))$
CLIENT ADMINISTRATOR
$CA(D_B(C_C))$
USER E
$U_E(D_B(C_C))$
USER B
$U_B(D_B(D_C(C_C)))$
CLIENT ADMINISTRATOR
$CA(D_B(D_C(C_C)))$
USER E
$U_E(D_B(D_C(C_C)))$
USER C
$U_C(CA(D_B(C_C))$
USER D
$U_D(CA(D_B(C_C))$
USER E
$U_E(CA(D_B(C_C)))$
USER/ DISTRIBUTOR C
$UD_C(CA(D_B(C_C)))$
USER/ DISTRIBUTOR C
$UD_C(CA(D_B(D_C(C_C))))$
USER C
$U_C(CA(D_B(D_C(C_C))))$
USER D
$U_D(CA(D_B(D_C(C_C))))$
USER E
$U_E(CA(D_B(D_C(C_C))))$
USER D
$U_D(UD_C(CA(D_B(C_C))))$
USER D
$U_D(UD_C(CA(D_B(D_C(C_C)))))$

FIG. 83

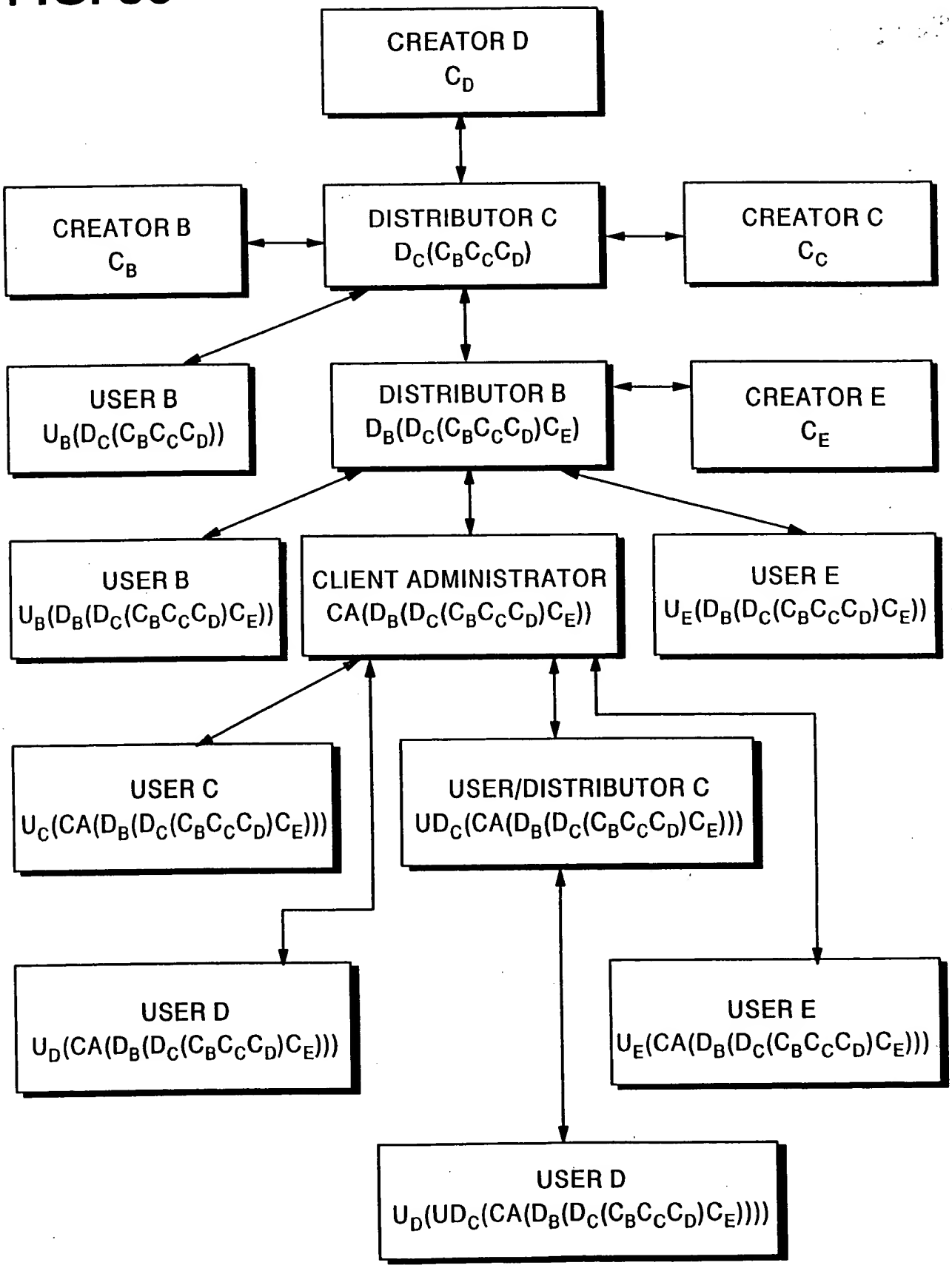

CREATOR D
C_D
CREATOR B
C_B
DISTRIBUTOR C
$D_C(C_BC_CC_D)$
CREATOR C
C_C
USER B
$U_B(D_C(C_BC_CC_D))$
DISTRIBUTOR B
$D_B(D_C(C_BC_CC_D)C_E)$
CREATOR E
C_E
USER B
$U_B(D_B(D_C(C_BC_CC_D)C_E))$
CLIENT ADMINISTRATOR
$CA(D_B(D_C(C_BC_CC_D)C_E))$
USER E
$U_E(D_B(D_C(C_BC_CC_D)C_E))$
USER C
$U_C(CA(D_B(D_C(C_BC_CC_D)C_E)))$
USER/DISTRIBUTOR C
$UD_C(CA(D_B(D_C(C_BC_CC_D)C_E)))$
USER D
$U_D(CA(D_B(D_C(C_BC_CC_D)C_E)))$
USER E
$U_E(CA(D_B(D_C(C_BC_CC_D)C_E)))$
USER D
$U_D(UD_C(CA(D_B(D_C(C_BC_CC_D)C_E))))$

FIG. 84

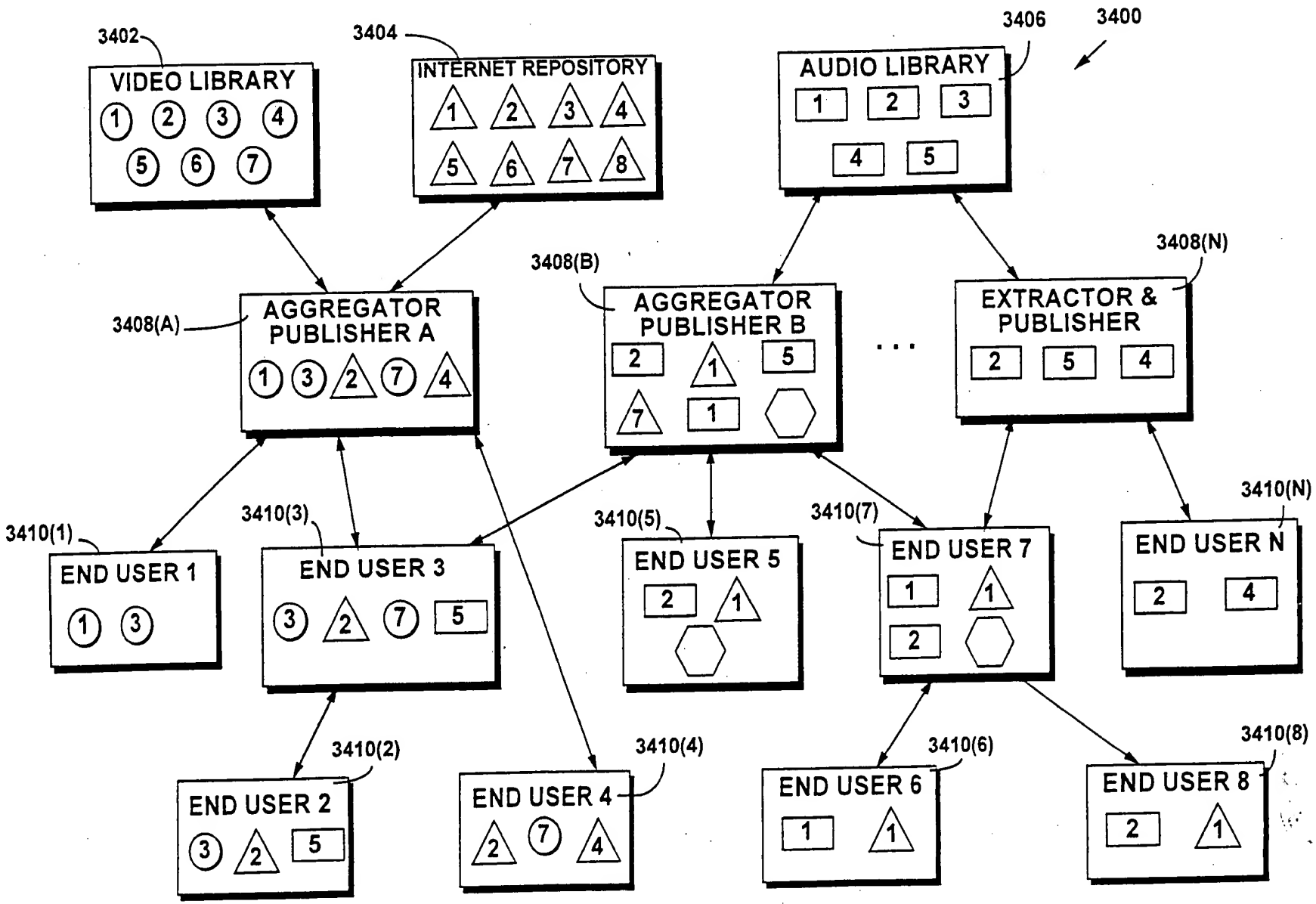

3402
VIDEO LIBRARY
1 2 3 4
5 6 7
3404
INTERNET REPOSITORY
1 2 3 4
5 6 7 8
3406
3400
AUDIO LIBRARY
1 2 3
4 5
3408(A)
AGGREGATOR PUBLISHER A
1 3 2 7 4
3408(B)
AGGREGATOR PUBLISHER B
2 1 5
7 1
...
3408(N)
EXTRACTOR & PUBLISHER
2 5 4
3410(1)
END USER 1
1 3
3410(3)
END USER 3
3 2 7 5
3410(5)
END USER 5
2 1
3410(7)
END USER 7
1 1
2
3410(N)
END USER N
2 4
3410(2)
END USER 2
3 2 5
3410(4)
END USER 4
2 7 4
3410(6)
END USER 6
1 1
3410(8)
END USER 8
2 1

FIG. 85

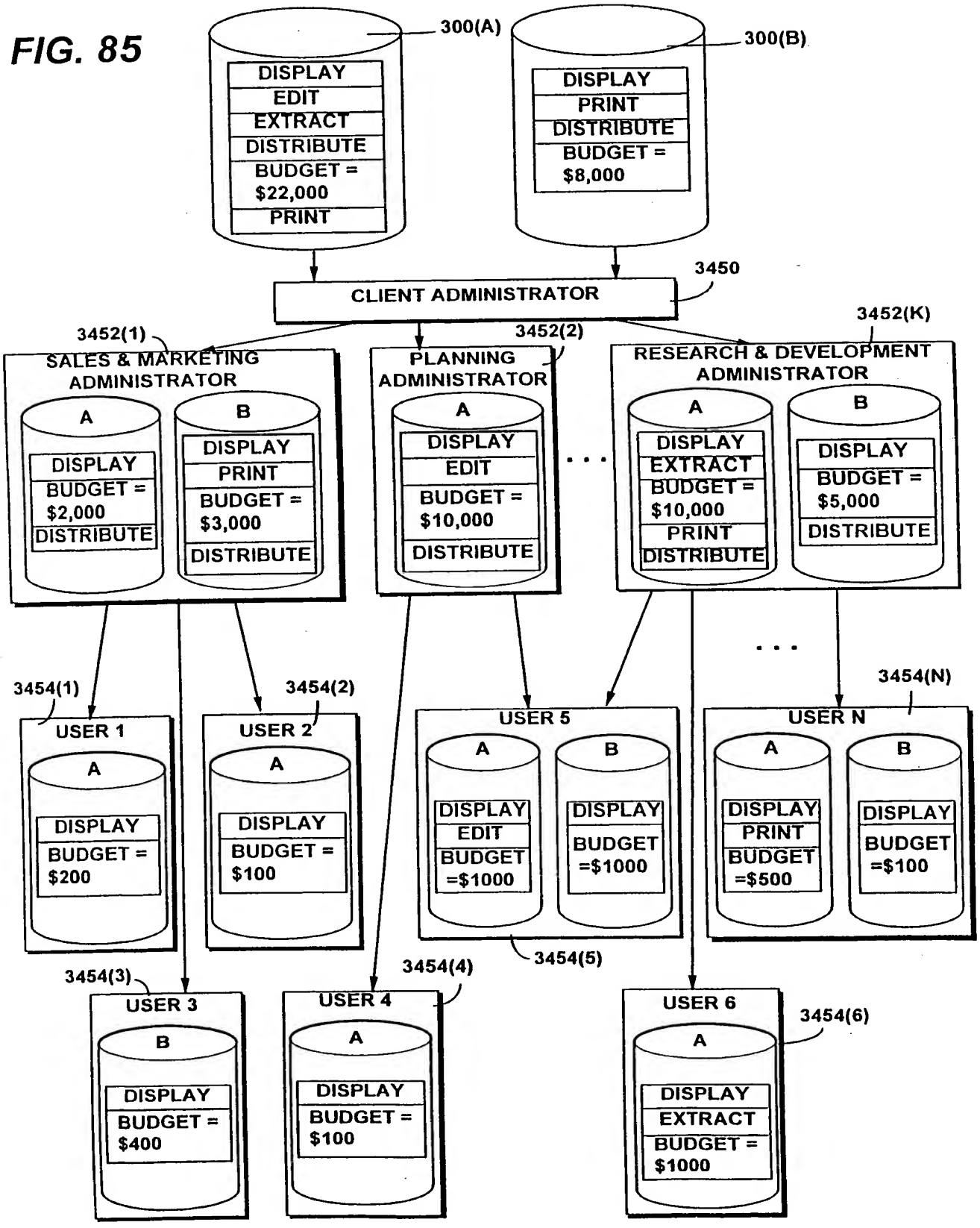

300(A)
DISPLAY
EDIT
EXTRACT
DISTRIBUTE
BUDGET = $22,000
PRINT
300(B)
DISPLAY
PRINT
DISTRIBUTE
BUDGET = $8,000
3450
CLIENT ADMINISTRATOR
3452(1)
SALES & MARKETING ADMINISTRATOR
A
DISPLAY
BUDGET = $2,000
DISTRIBUTE
B
DISPLAY
PRINT
BUDGET = $3,000
DISTRIBUTE
3452(2)
PLANNING ADMINISTRATOR
A
DISPLAY
EDIT
BUDGET = $10,000
DISTRIBUTE
3452(K)
RESEARCH & DEVELOPMENT ADMINISTRATOR
A
DISPLAY
EXTRACT
BUDGET = $10,000
PRINT
DISTRIBUTE
B
DISPLAY
BUDGET = $5,000
DISTRIBUTE
3454(1)
USER 1
A
DISPLAY
BUDGET = $200
3454(2)
USER 2
A
DISPLAY
BUDGET = $100
3454(3)
USER 3
B
DISPLAY
BUDGET = $400
3454(4)
USER 4
A
DISPLAY
BUDGET = $100
3454(5)
USER 5
A
DISPLAY
EDIT
BUDGET =$1000
B
DISPLAY
BUDGET =$1000
3454(6)
USER 6
A
DISPLAY
EXTRACT
BUDGET = $1000
3454(N)
USER N
A
DISPLAY
PRINT
BUDGET =$500
B
DISPLAY
BUDGET =$100

FIG. 86

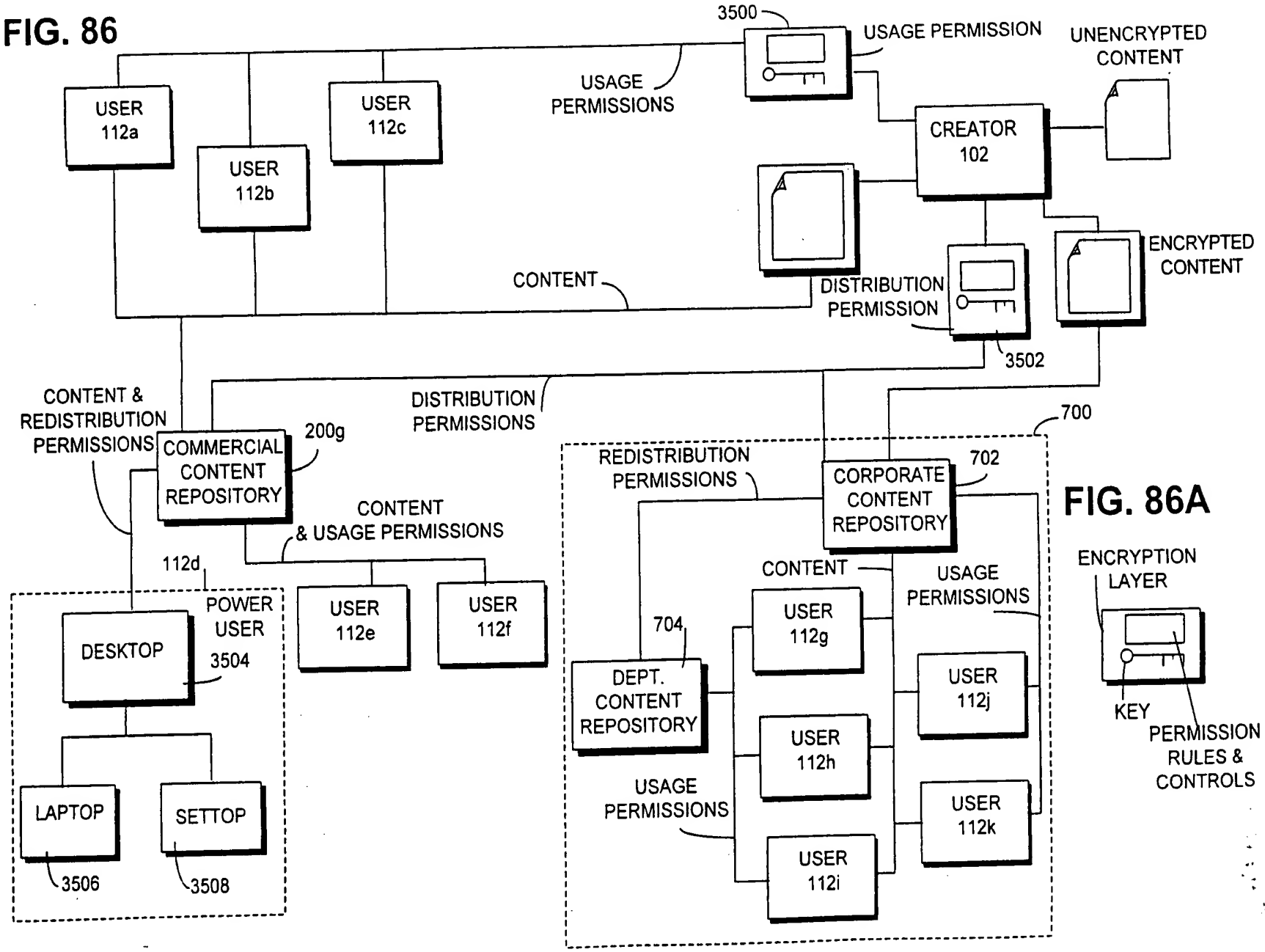
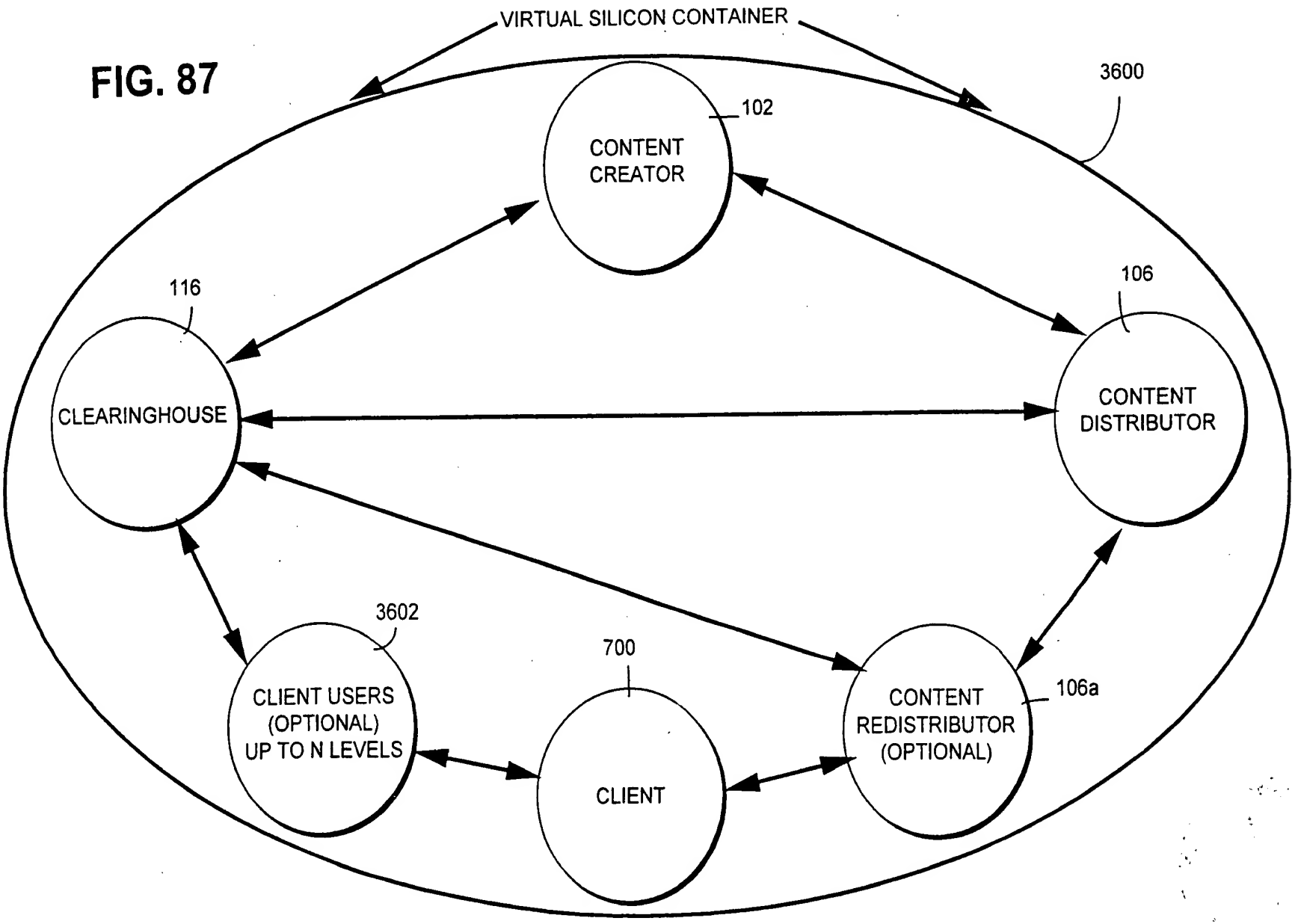


FIG. 86A

FIG. 87


VIRTUAL SILICON CONTAINER
3600
102
CONTENT CREATOR
116
106
CLEARINGHOUSE
CONTENT DISTRIBUTOR
3602
700
106a
CLIENT USERS (OPTIONAL) UP TO N LEVELS
CLIENT
CONTENT REDISTRIBUTOR (OPTIONAL)